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GAS ABSTRACTS

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1. GAS INDUSTRY

Change-Over

CONVERSION TO NATURAL GAS IN NEW ENGLAND UNDER WAY. *Oil Gas J.* **50**, 161 (1951) October 18.

First among New England Companies converted to use natural gas from Northwestern Gas Transmission Co. were Springfield Gas Light Co., Worcester Gas Light Co., Holyoke Gas Light Co., and Pittsfield Gas Light Co. The dispute over rates between Northeastern and FPC has been settled with 2 cents increase to 46 cents per MCF instead of the original 9 cent boost.

D. L. Nicol

Federal vs State Control

Bow, F. T. STATE VERSUS FEDERAL CONTROL OF NATURAL GAS. *Public Utilities Fort.* **48**, 539-542 (1951) October 25.

The PAD order to restrict natural gas companies from supplying gas to any new house heating customers or large volume industrial customers without its approval is viewed as Federal usurpation of states rights, duplication of (state) regulatory agencies and powers, and further centralization of controls in Washington. The vital importance of natural gas to the national economy, new housing and the defense effort requires re-evaluation of steel allocation programs and making more line pipe available.

J. D. Parent

Fire Control

Castle, L. FIGHTING LOADING RACK FIRE. *Natl. Petroleum News* **43**, 34, 35 (1951) October 31.

A simple and inexpensive fire control system has been designed for petroleum chemical tank-loading racks. Making use of existing handrails, spray nozzles were placed at six to ten foot intervals to completely blanket the loading area with a fine mist in the event of a flash fire.

D. L. Nicol

Cobb, A. L. AFTERNOON IN BRIGHTON. *Natl. Fire Prot. Assoc. Quarterly* **45**, 85-91 (1951) October.

A detailed sequence of events of the Rochester Gas explosion on September 21, 1951, is given. Recommendations for future utility installations are made.

W. G. Bair

GAS PIPELINE BREAK, JEFFERSON, PA. *Natl. Fire Prot. Assoc. Quarterly* **45**, 93-94 (1951) October.

The article gives an account of the explosions and fires that resulted from the break in a 16″ 200 psi natural gas line at Jefferson, Pa., February 9, 1951.

W. G. Bair

Gas Conservation

CAUTION LIGHT FOR GAS. *Oil Gas J.* **50**, 71-72 (1951) October 25.

Natural gas undersells other fuels in many areas. A price increase would encourage discovery, development and installation of new lines, but this would not solve the problem of insatiable demand, due to the convenience and cleanliness of gas. A complicating factor is the greatly increasing use of natural gas by industry for power and petrochemical manufacture. It appears possible that some communities now unable to get natural gas will be permanently deprived of it, and others now using it will be unable to obtain increased deliveries.

J. D. Parent

Gas Industry Plateau?

Wilson, C. O. LEVELING OFF SEEN. NATURAL - GAS - INDUSTRY LEADERS SEE NEW ACTIVITY SLACK-OFF FOLLOWING COMPLLETION OF VAST POSTWAR EXPANSION PROGRAM. *Oil Gas J.* **50**, 76-77 (1951) October 18.

After spending five billion dollars in 6 years the natural gas industry is expected to level off somewhat after the coming year. Time is needed for coordination and careful planning for the future. Higher well-head prices, need of new reserves, and the pessimistic outlook on the availability of steel for fabrication of line pipe are factors requiring careful analysis.

J. D. Parent

Gas Plant Safety

Deveney, W. T. SAFE PRACTICE IN COAL GAS PRODUCTION. Paper *Am. Gas Assoc. 2nd Annual Safety Conf.* (1951) September 17-

18; *Am. Gas J.* 175, 27 (1951) October; *Canad. Gas J.* 44, 274-275 (1951) October; *Public Utilities Fort.* 48, 598 (1951) October 25.

The numerous hazards in the production of gas in a coke-oven plant are briefly described. Improved precautions, devices, operating techniques and regulations have tended to reduce dangers and accidents, but the main problem, man-failure, requires continuous safety education for all workers.

O. P. Brysch

House Heating

HEATING HABITS SURVEY GIVES KEY TO UPGRADING. *Gas* 27, 64 (1951) October.

Selected facts concerning home heating habits and the reasons for these habits are presented. The data was obtained for Minneapolis-Honeywell Regulator Co. by an independent research organization which contacted some 3000 consumers in 102 cities, towns, and villages throughout the nation.

B. E. Hunt

Materials Allocations

Rather, C. P. THE GAS INDUSTRY AND PAD. *Public Utilities Fort.* 48, 534-538 (1951) October 25.

The author, president of Southern Natural Gas Co. since 1938, is Assistant Deputy Administrator, Petroleum Administration for Defense. He explains the organization and operation of PAD, which merely allocates what the Defense Production Administration releases to PAD. In the 3rd quarter, 1951, gas received 75% of its estimated requirements. Problems now developing in oil transportation indicate that for a time the needs of oil lines may be considered more essential than those of gas.

A. E. Neumann

Integrated Gas Supply

Hess, F. O. LET'S INTEGRATE PIPELINES WITH MANUFACTURED GAS PLANTS. *Gas* 27, 43-45 (1951) November.

About 3% of the total business volume should be spent in research to achieve real progress. This would mean that at least $100 million should be spent annually by the gas industry on research. The author suggests making a study aimed toward integration of the gas supply system, particularly in the region east of the Mississippi, so that such advantages as load balancing, distribution of cost and insurance against failure of supply may be realized. The use of hydrogen admixed with natural gas is proposed in order to improve interchangeability.

J. D. Parent

Rate Increases

GEORGIA PUBLIC SERVICE COMMISSION RE SOUTH ATLANTIC GAS COMPANY. *Public Utilities Fort.* 48, 29 (1951) October 11.

The Commission allowed the South Atlantic Gas Co., Savannah, Ga., to sufficiently increase its residential and general commercial rates for gas service to allow the utility a 6½% rate of return on its average capitalization.

A. E. Neumann

SOUTHERN COUNTIES GAS SEEKS TO PASS ON GAS RATE BOOST. *Gas Age* 108, 6, 114 (1951) October 11.

Southern Counties Gas Co. of Los Angeles, Cal., has petitioned the FPC for a rate increase to its sole wholesale customer, San Diego Gas & Electric Co. The rate boost is designed to pass on to San Diego Gas & Electric the price increase that Southern Counties Gas Co. will have to pay for natural gas from its supplier.

W. G. Bair

WASHINGTON GAS LIGHT RATE RISE GOES IN EFFECT. *Gas Age* 108, 114-116 (1951) October 11.

The proposed rate increase for wholesale natural gas service to Washington Gas Light Co. from Atlantic Seaboard Corp. will be effective September 1. The FPC had suspended the increase, but Atlantic Seaboard posted a $100,000 bond to cover any rate increase not found justifiable by the FPC. A major source of contention is the difference in the yearly cost of the increase as computed by the two companies involved.

W. G. Bair

Rate Regulation Bases

Crocker, S. M. IS GAS RATE REGULATION REALISTIC? *Public Utilities Fort.* 48, 546-549 (1951) October 25.

Attempts to have a realistic standard of regu-

lation have passed through various stages. At first, the equipment reproduction cost was featured. Later, the FPC favored the original cost as a basis. Others have said that the only important point is to permit adequate earnings. The author points out the necessity of considering the changing value of the dollar.

J. D. Parent

Herrman, W. J. RATE AND FINANCING PROBLEMS OF GAS INDUSTRY. *Public Utilities Fort.* 48, 553-560 (1951) October 25.

The author compares the earning of utilities with various other industries on the basis of rate of return on the stockholder's equity. The recent high percentage return rate is said to be due to the lesser value of today's income dollar compared to the average value of the investment dollar and also the use of depreciation based on cost. In the Hope decision of 1944, the Supreme Court said that the measure of return for a gas company should be the return earned on other comparable investments. The author discusses factors which tend to keep utility earning rates below those of other industries, and states that the lack of growth of earnings can readily result in higher capital costs to a utility. Sales of stock must be depended upon more and more for new money, and the salability of such stock will be decreased unless growth of earnings can be anticipated.

R. T. Ellington

2. APPLIANCES

Appliance Improvement

RESEARCH AND UPGRADING. *Gas*, 27, 44-48 (1951) October.

The recent studies on domestic gas research supported by the PAR plan are summarized with respect to the effect of these studies on the upgrading of appliances. This upgrading presents the salesman with a superior product to offset the competition of electrical appliances.

D. L. Nicol

Appliance Marketing

Eilbirt, H. A STUDY OF THE DISTRIBUTION FLOW IN APPLIANCES AND EQUIPMENT. *Am.Gas. J.* 175, 19-26 (1951) October.

A marketing specialist surveys current practices and the distribution pattern in the sale of gas appliances and equipment, and points out weaknesses. A major weakness is that few distinct gas appliances are available, as compared to thousands of electric appliances on the market. Because the average distributor or retailer cannot make a living selling gas appliances alone, gas appliances tend to become auxiliary lines attached to other businesses and receive secondary attention. Some conclusions and suggestions are: a) a more complete line of appliances; b) the utilities remain an important outlet, and cooperation between manufacturer and this outlet seems essential; c) financing plans for dealers and consumers may need more attention than they have had; d) sales effort at all levels needs to be continual.

A. E. Neumann

Burners

Burklin, A. J. (assigned to A. O. Smith Corp.) SINGLE AXIAL PORT GAS BURNER WITH TWO-STAGE MIXING. U.S. 2,569,514 (1951) October 2.

The object of the invention is to provide a burner capable of efficient operation over a wide range of fuel input. Primary air is added in two stages. The burner is a pair of concentric tubes with the first stage of primary air inspirated at a level below the tip of the spud. The second stage of primary air is added below the top of inner concentric tube.

B. G. Lang

Jaye, R. C. (assigned to Syncromatic Corp., Wisc.) SLOTTED OUTLET GAS BURNER HEAD. U.S. 2,573,144 (1951) October 30.

This burner design is said to give higher capacities, require less primary air, have better distribution of gas to the burner jets, and have no flash back with very low gas pressure. The burner head and venturi tube are integrally cast. The burner head is formed by the two slanting surfaces which meet at a peak. The jets are slots which are milled across the peak.

B. G. Lang

Jenny, R., Switzerland (assigned to Meyerhofer G. m. b. H.) GAS-BURNER HEAD WITH HIGH-PRESSURE AIR JETS. U.S. 2,567,485 (1951) September 11.

Air is admitted at high pressure through two rows of holes, which give air-whirl paths in opposite directions at different heights above the face of the burner. Gas at low pressure is admitted through a central nozzle-shaped conduit.

B. G. Lang

Mayer, C. M. (assigned to The Tappan Stove Co., Ohio) BURNER GRATE. U.S. 2,571,741 (1951) October 16.

A simple grate for a domestic range top burner is formed from a single endless piece of spring wire. This seats on a drip pan which is a stamping.

B. G. Lang

Miller, A. L. and Woolley, P. (assigned to Mission Appliance Corp., Calif.) SHEET METAL GAS BURNER WITH INTERNAL FUEL DISTRIBUTOR. U.S. 2,572,273 (1951) October 23.

This burner is made with sheet metal stampings that are welded together. The burner may be designed to fit into a predetermined space, although this space does not permit use of the ideal mixing chamber configuration, because of its novel gas distribution plate.

B. G. Lang

Swenson, P. F. and Pravda, M. F. (assigned to The Cleveland Research Corp., Ohio) GAS BURNER WITH MODULATED FLAME ORIFICE. U.S. 2,572,675 (1951) October 23.

Modulation is produced by variation of gas pressure on a diaphragm which varies gas orifice size and amount of inspirated combustion air. The operating forces come from gas pressure which is controlled by a thermostat.

B. G. Lang

Dual Fuel Heating

WHAT ABOUT ADDITIONAL HOUSE HEATING? *Gas Age* **108**, 26, 27, 50 (1951) October 25.

The question of fuel restriction which limits additional house heating load is met by the alternative of dual fuel heating. This equipment is set up so that as the atmospheric temperature decreases below a set reading, the fuel is automatically switched from gas to oil. With this mode of operation, the customer has the benefit of low cost fuel for the majority of the heating period, and only on the coldest days, when gas is in short supply, is the oil used.

D. L. Nicol

Gas Valves

Miller, A. L. (assigned to Mission Appliance Corp., Cal.) COMBINATION MAIN AND PILOT VALVE. U.S. 2,572,274 (1951) October 23.

This valve is designed to be in series with a main burner and act as a pilot. If the pilot fails, there will be 100% shut off. This pilot heats a thermally responsive rod that keeps a spring-loaded plug valve in open position. Pilot failure allows the rod to cool and the spring to return the inner plug valve to off position. To re-light, the outer concentric plug valve is turned to off-position, the pilot lighted, and after the thermal rod becomes heated turned to the on-position.

B. G. Lang

Mueller, E. H. VALVE FOR CONTROLLING FUEL GAS. U.S. 2,572,507 (1951) October 23.

This range valve has two positions of adjustment for flow of gas. The simmer rate may be varied by pre-adjusting the valve. These positions are located by audible clicks as the valve is turned into position.

B. G. Lang

Interchangeability

AMERICAN SCIENTISTS INVESTIGATE BRITISH GAS PRACTICE. BRAY JETS SELECTED FOR BURNER DESIGN STUDY. *Gas World* (British) **134**, *Industrial Gas Suppl.* 116-118 (1951) October 20.

This is a review of the results of an American Gas Association study of the Bray jet.

B. G. Lang

Pilots

"LADDER" OR BRIDGING PILOTS-I. *Gas World* (British) **134**, *Industrial Gas Suppl.* 112-113 (1951) October 20.

This article is an interim report on ladder pilots, which have been checked for 8 to 9 months in

various types of plants to support the laboratory test.

B. G. Lang

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Johnson, A. R. SIX PROBLEMS IN SPACE HEATING. p. 278

3. COMBUSTION AND INDUSTRIAL FURNACES

Atmospheric Pollution

McCabe, L. C. ATMOSPHERIC POLLUTION. *Ind.Eng.Chem.* **43**, 135A-138A (1951) October.

Brief reviews are given of 3 papers presented at the XIIth International Congress of Pure and Applied Science, September 1951, New York. These were: (1) expansion of U.S. industrial activity; (2) edge filtration operating characteristics of nine filter-media; and (3) chemical analysis of automobile exhaust gases under 3 operating conditions. The latter shows aldehydes, nitrogen oxides and organics (to C_3) in concentrations reaching 250,750 and 5000 mg./cu.m. respectively.

O. P. Brysch

Coal Combustion Tests

Barkley, J. F. SIGNIFICANCE OF LABORATORY TESTS OF COAL AND COKE FOR COMBUSTION. *U.S. Bureau Mines Information Circular* 7619 (1951) September.

A collection of 13 papers by experienced fuel engineers is presented to answer questions as to the significance of ASTM laboratory tests on bituminous coal, anthracite and coke in their combustion on various types of industrial and domestic fuel-burning equipment. This is part of a larger project on "Significance of Tests on Coal and Coke" assigned to Subcommittee XVII of Committee D-5.

O. P. Brysch

Gas-Fired Process Equipment

Cordwell, J. I. TECHNICAL DEVELOPMENT IN GERMANY-I. *Gas World* (British) **134**, *Industrial Gas Suppl.* 94-97 (1951) September 15.

This is a review of recent work on design, development, and operational results of gas-fired wire heating and galvanizing furnaces in Germany.

B. G. Lang

Cordwell, J. I. TECHNICAL DEVELOPMENT IN GERMANY-II. *Gas World* (British) **134**, *Industrial Gas Suppl.* 108-110 (1951) October 20.

This is the conclusion of a review on gas-fired wire heating and galvanizing furnaces. Production increased only after a means of increasing heat input to galvanizing baths was found. An earlier means was the firing onto a combustion catalyser of carborundum lumps. Radiant-tube heating of the zinc galvanizing baths is the most modern.

B. G. Lang

Smith, A. Q. HOW WYATT'S STRESS RELIEVES GIANT EQUIPMENT. *Ind. Gas*, **30**, 3-5, 27, 28 (1951) October.

Large direct gas-fired heat-treating furnaces are used to relieve stresses caused by localized heating. One vessel too large for any available furnace was stress-relieved by a gas-fired blower system heating directly into the vessel. The vessel was jacketed with a 3-inch thick asbestos coa tto hold it at 1200° F for the required stress relieving period.

B. G. Lang

GRAIN GETS THE GAS TREATMENT. *Gas World* (British) **134**, *Industrial Gas Suppl.* 100-101 (1951) September 15.

Grain is dried by gas-fired air heaters. Air temperature is at a maximum of 135° F. This plant has a rated output of 2 tons per hour with a 6% moisture reduction.

B. G. Lang

Heat-Release Mechanisms

FLAME RADIATION RESEARCH JOINT COMMITTEE: REPORTS OF 1949 TRIALS AT IJMUIDEN. *J. Inst. Fuel* (British) **24**, Suppl., S-1 to S-16 (1951) November.

This is an 8-part progress report on the researches by a British - Dutch - French - Swedish team into the phenomena of thermal radiation from flames. Trials carried out in a model of a steel works furnace at Ijmuiden, Holland, were designed to give information on the development of instruments for use in furnaces, on the

accuracy of their readings and on furnace control. A review of previous work done on luminous radiation includes research into the chemistry of carbon formation, laboratory and theoretical studies of the physics of luminosity, large scale studies of luminosity and the aerodynamics of furnaces. The heat flow meters used on the experimental furnace to measure the radiant heat energy received by a cold body at different points along the furnace, and the development and operation of the pyrometers used in the trials are described. The absolute accuracy of the results and the causes of variations in the main experiments are discussed.

R. A. Brown

Howland, A. H., and Simmonds, W. A. A MECHANISM OF INTENSE GASEOUS COMBUSTION. *J. Inst. Fuel* (British) 24, 252-255 (1951) November.

Empirically designed high heat release burners have been studied to determine the mechanism of combustion. These burners, in which a premixed air/gas mixture is burnt inside a refractory tube, have attained heat releases as high as 100 million BTU/hr/cu ft. The combustion has been shown to be of a novel-type and consists of a series of explosions. An explosion starts in the part of the mixture entering the burner immediately after the previous explosion, and travels upstream through the fresh mixture until it is extinguished at the cool, narrow-bore inlet nozzle.

D. L. Nicol

Gas Turbines

Shepherd, D. G. REVIEW OF COMBUSTION PHENOMENA FOR THE GAS TURBINE. *Trans.Am.Soc.Mech.Engrs.* 73, 921-934 (1951) October.

Combustion-chamber design information is comparatively meager except for overall performance data from existing gas turbines and on combustion intensity and fractional pressure loss. This paper presents a survey of some of the basic material on ignition, flame propagation and burning as a step in helping the combustion engineer to correlate it with his knowledge of existing overall performance.

D. L. Nicol

Heat Pump

Parkerson, W. THERMAL CHARACTERISTICS OF SOILS FOR GROUND COIL DESIGN. *Heating & Ventilating*, 48, 83-86 (1951) October.

An analysis of available information and resulting presentation of formulas for soil heat transfer are given for use in design of heat pump installations.

B. G. Lang

Industrial Burners

Buckholdt, R. E. (assigned to The Salem Engineering Co., Ohio) GASEOUS FUEL BURNER FOR FURNACE WALLS. U.S. 2,571,336 (1951) October 16.

This gas burner is of such design that there is sufficient incandescence in the port lining to prevent deposition, and for escape of most of the combustible colloidal carbon particles. The burner is a set of concentric tubes. The outer tube, which carries the air, is tapered at the furnace end, forming an orifice. The flow forms a converging cone of combustion air. The inner tube has a row of gas outlets drilled near the end, which is tapered parallel to the outer tube. The flow of gas forms a diverging cone of fuel gas. The effect is an intimate mixing of air and gas. One design also has a refractory bulb, which is tapered parallel to the diverging port and attached to the end of the inner tube. This bulb assists the flow to have a wiping action at the burner-port surface.

B. G. Lang

Cannon, M. M., Jr. (assigned to Emhart Manuf. Co., Del.) GAS BURNER FLAME ARRESTER. U.S. 2,572,445.

This patent is a description of a flame arrester which can be installed ahead of a pre-mix burner to prevent flash back into the final line.

B. G. Lang

Cartun, P. O. (assigned to General Electric Co., New York) MULTIPLE GAS BURNER FOR TIPPING-OFF GLASS ARTICLES. U.S. 2,571,537 (1951) October 16.

A multiple gas burner which automatically tips-off lamb bulbs and discharges the waste section is described.

B. G. Lang

Henwood, J. B. (assigned to Selas Corp. of America) RADIANT GAS BURNER INTERNALLY FIRED. U.S. 2,570,554 (1951) October 9.

This burner design increases the heating capacity of a given size burner by projecting radiant heat from refractory surfaces. A premixed combustible mixture is admitted to a jacket-cooled burner tube. From this tube the gas is subdivided into a multiplicity of discharge ports. The flames flare out into narrow spaces formed by three concave-shaped walls of ceramic material. Flue gases may be directed out in the rear of burner where controlled atmosphere is desired. Mention is made of a 500,000 Btu/hr burner which has a radiant surface of 2800° F.

B. G. Lang

Smith, W., Jr. (assigned to General Motors Corp., Ohio) MULTICHAMBERED GAS BURNER WITH SELECTIVE GAS SUPPLY. U.S. 2,573,502 (1951) October 30.

This multichambered burner has two annular sections, each with a separate venturi mixing tube and separate gas supplies. The fuel supply is controlled by a single valve which first progressively increases the fuel supply to the outer ring, and then to the inner section. This burner is claimed to have high efficiency from high to low gas inputs, and to be less likely to blow out at low input.

B. G. Lang

Lignite Boiler Fuel

Hoffman, J. W. and Drabelle, J. M. BOILER OPERATION WITH LIGNITE. *Combustion* 23, 57-58 (1951) October.

A digest is given of the September ASME paper which describes the use of lignite as boiler fuel in Canada and North Central United States. Historical development of equipment from 1915 is given, showing the trend to spreader-stoker firing. Eight U.S. and Canadian firms report 14 stoker-fired and 3 pulverized-fuel-fired boiler installations, ranging from 60,000 to 160,000 lb steam/hr and installed within the last 5 years. The moisture, fly-ash, slagging and pulverization troubles encountered with lignite firing are discussed, and two plant tests of pulverized lignite firing are briefly described.

O. P. Brysch

Overfire Jets

Bituminous Coal Research, Inc. APPLICATION OF OVERFIRE JETS TO PREVENT SMOKE FROM STATIONARY PLANTS. *BCR Aid to Industry*, 500-300, (1951).

This is a revision of *BCR Techn. Report* 7, the results of which were reported in *Trans. Am. Soc. Mech. Engrs.*, October, 1943 and March, 1944. The engineering information is useful in the design, construction and application of overfire jets to abate smoke from stationary plants. Sections of the report are devoted to design and construction of blower jets, steam-air jets and plain steam jets; to location, control and care of jets; typical applications; a listing of manufacturers of jets, control, and smoke-alarm equipment. Tabulated and graphical data, and many diagrams are given.

O. P. Brysch

Utilization, – Air Conditioning

York Corp. POINTERS ON AIR CONDITIONING DUCT DESIGN AND INSTALLATION. *Heating and Ventilating* 48, 88-97 (1951) October.

Practical pointers on duct specifications, design and installation are given, with much data in tabulated and graphical form.

B. G. Lang

Utilization, – Water Heating

Reynolds, T. W. MEASURES TO AVOID TROUBLES IN DOMESTIC HOT WATER SYSTEMS. *Heating and Ventilating* 48, 73-77 (1951) October.

Part 1 explains with sketches the troubles in domestic hot water systems. Most troubles are due to faulty designs, and the article explains how correct piping will relieve these conditions.

B. G. Lang

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Conan, H. R. BURNING VELOCITY DETERMINATIONS. Part V. p. 286

Jones, E. SUPPRESSION OF FLAME IN EXPLOSIVE SYSTEMS. p. 288

Linnett, J. W. BURNING VELOCITY DETERMINATIONS. Part IV. p. 287

Pickering, H. S. BURNING VELOCITY DETERMINATIONS. Part VI. p. 287

4. CARBONIZATION AND GASIFICATION

Coal Cleaning

Crentz, W. L., Bailey, A. L., and Miller, J. W. PREPARATION CHARACTERISTICS OF COAL OCCURRING IN WESTMORELAND COUNTY, PA. *U.S. Bureau of Mines Report of Investigations* 4823 (1951) October.

With the approaching depletion of the high quality Pittsburgh bed in Westmoreland County, Pa., some attention is being given to the upgrading of coals of other beds to metallurgical quality. Samples from 15 mines throughout the county were subjected to float-and-sink tests, and detailed graphs and data are reported for the Redstone, Upper Freeport, Lower Freeport, and Lower Kittanning beds. These are amenable to mechanical cleaning, although both Freeport coals will require fine crushing and precise control of washing to reduce the sulfur content.

O. P. Brysch

King, D. S. (England) DEWATERING OR DRYING OF PEAT. U.S. 2,566,943 (1951) September 4.

This invention relates to a device for de-watering or drying of peat in which the peat is first extruded to a ribbon shape and then passed between two rollers.

E. J. Pyrcioch

Symington, R., and Hamilton, J. THE DEVELOPMENT OF THE "SIMCAR" DENSE-MEDIUM WASHER, WITH REFERENCE TO THE PILOT COAL WASHING PLANT AT CHEADLE HEATH. *Gas World* (British) 134, *Coking Sec.* 99-105 (1951) October 6.

The development of the Simon-Carves Ltd. dense-medium coal washing plant, based on the magnetic cleaning of the medium (American Cyanamid Co.) is described in detail. Unique compartmentalized "coal" and "dirt" wheels, operating in a 1.50-2.00 sp gr bath of water-magnetite, give a "sink and float" separation to consecutive small portions of the feed, and immediately remove the separated materials. The contaminated medium is deslimed by magnetic attraction in an inverted rotating weir, and densified as desired in a cone-tank below, while the clay-shale slime is removed by rising currents through an annular surface launder. Varieties of magnetic media are described and the Simcar process for manufacturing a suitable medium from blast-furnace flue dust is outlined. Illustrations of plant and units, and tabulated coal washing data are given.

O. P. Brysch

Coal Gasification

Atkinson, R. G. (assigned to Phillips Petroleum Co.) COAL GASIFICATION PROCESS AND APPARATUS. U.S. 2,572,829 (1951) October 30.

This patent covers a coal gasification process using a mixture of coal, steam and oxygen, the gas produced being water gas, and a reactor for the process for operating temperatures above 750° C.

E. J. Pyrcioch

Coal Oxidation

Roetheli, B. E. (assigned to Standard Oil Development Co.) PROCESS FOR THE MILD OXIDATION OF CARBONACEOUS SOLIDS. U.S. 2,560,478 (1951) July 10.

The fluidization principle is applied to the controlled mild oxidation treatment of carbonaceous materials, especially coals, to yield a product suitable for special carbonization, gasification, hydrogenation or extraction.

O. P. Brysch

Coal Structure

Dryden, I. G. C. THE ULTRA-FINE PHYSICAL STRUCTURE OF BRIGHT BITUMINOUS COALS. (Review Series No. 106) *British Coal Utilization Research Assoc. Monthly Bull.* 15, 329-339 (1951) August/September.

Modern conflicting opinions on coal structure are reviewed in the light of the most recent experimental reports. Recent studies of X-ray intensity maxima appear to support some features of Riley's model of planar units, but the known structural disorder of coal requires the aid of other methods of experiment to complete the explanation. Recent work on density, poro-

sity, surface area by adsorption, and heat of wetting upon Canadian, American, South African and Australian coals has raised questions of intermolecular imbibition, and abnormal structure of the adsorbed monolayer. More work on variations in optical reflectance also is required. Molecular weights of the coal extracts obtained with certain solvents are in conflict with the size postulated for the Bangham micelle, but are in agreement in the case of other solvents. Solvent extraction requires much further study, but appears to be very useful.

O. P. Brysch

Coke Handling

Milkie, A. A. COKE SCREENING. *Blast Furnace Steel Plant* 39, 1091-1093 (1951) September.

This article directs attention to questions of design of screens to meet changing conditions in production of sized coke. Modern types of screen cloth, and of supporting and tensioning the cloth in the vibrating frame, are discussed and illustrated. O. P. Brysch

Miller, R. TREATMENT OF COKE. *Gas Times* (British) 69, 43-44, 47, 49-50, 53-54 (1951) October 5: *Gas J.* (British) 268, 101-102, 107-111 (1951) October 10.

Savings in labor costs and improved design of handling equipment as experienced in other industries probably offer greater advantages in the preparation of coke. Considerable description is given of types of conveying, screening, crushing and storing equipment which have been or may be applied in coke handling.

O. P. Brysch

Coke Oven Structure

Millard, R. K. COKE-OVEN BUCKSTAY STRUCTURE. U.S. 2,571,597 (1951) October 16.

A sturdier buckstay and door-frame structure for coke-ovens is claimed, which includes H-beam stays with webs turned normal to the wall. These stays support flat-faced door-sealing surfaces. Excessive gas leakage is prevented by a deep, closely-fitting refractory door nose, grooved by a vertical channel through which leaking gas is drawn upward to the top of the oven.

O. P. Brysch

Coke Porosity

Gilchrist, J. D. and Taylor, J. MACROPORE SIZE ANALYSIS OF METALLURGICAL COKE. *J. Inst. Fuel* (British) 24, 207-211 (1951) September.

After a brief review of methods of estimating the sizes of pores in coke, the authors describe their method, which is based upon the change in apparent density with successive crushing of particles and progressive destruction of larger pores. A plot of pore volume against calculated pore sizes shows that Scottish, Welsh and Durham metallurgical cokes contained two distinct groups of pores, one of size 0.05 mm to 0.5 mm and the other 1.0 mm to 2.0 mm Possible relationships of pore size, surface area and distribution to other coke properties pertinent in furnace performance are discussed.

O. P. Brysch

Coking Coal Reserves

Dowd, J. J., Turnbull, L. A., Toenges, A. L., Abernethy, R. F., and Reynolds, D. A. ESTIMATE OF KNOWN RECOVERABLE RESERVES OF COKING COAL IN FLOYD COUNTY, KY. *U.S. Bureau of Mines Report of Investigations* 4813 (1951) September.

This is the seventh of the county coking coal reserves survey. In Floyd County there are 3 mafor coal beds; Upper Elkhorn No.3, U.E. No.2, U.E. No.1. There are also 2 minor beds, Winifrede and Fire Clay. Known measured plus indicated reserves in all beds of thickness 14 in. and greater are estimated at 1,670 million tons, of which 1,305 million are of 28″ or more thickness. Weighted average recoveries to date are 53.23%, which indicates a recoverable reserve of 694,-667,000 tons as of January 1, 1949. The coals are high-volatile A bituminous, and are coking, but must be blended with higher-rank coals to produce metallurgical grade by-product coke.

O. P. Brysch

Electrical Carbonization

Minchin, L. T. ELECTRICAL METHODS OF CARBONISING COAL. *Gas World* (British) 134, 297-299 (1951) October 6.

Because of the complicated heat-exchange apparatus required to maintain the high thermal efficiency of modern coal carbonization process-

es, the author reviews the advantages of internal heating, especially by electricity, which would simplify the plant. The Stevens (Detroit Edison Co.) intermittent process, and the Wilson Dam (TVA) continuous process, using 350 and 433 kwhr ton coal respectively, are compared with the Norwegian Hydro-Electric Nitrogen Co. continuous process under development at Notodden, Norway, which claims 120 kwhr ton as an attainable efficiency. The advantages to the gas industry, by use of off-peak electricity, are worth investigation.

O. P. Brysch

Electrical Precipitator

Hedberg, C. W. (assigned to Research Corporation, New York) ELECTRICAL PRECIPITATOR WITH DUAL DISCHARGE ELECTRODES. U.S. 2,567,709 (1951) September 11.

A precipitator is described, with 2 sets of discharge electrodes spaced in complementary relation to the extended surface electrodes, which are spaced apart in the direction of gas flow to provide successive precipitating zones. The extended surface electrodes provide chutes along which the collected material is conducted to a receiver.

O. P. Brysch

Warburton, R. W. (assigned to Westinghouse Electric Corp.) ELECTROSTATIC PRECIPITATOR. U.S. 2,571,079 (1951) October 9.

This patent describes an electrostatic precipitator for removing dust and other small particles from gases incorporating a disposable collector cell.

E. J. Pyrcioch

Free-Swelling Index

Swartzman, E. and Behnke, G. C. USING ELECTRIC FURNACES AND HEATERS TO DETERMINE THE FREE-SWELLING INDEX OF COAL. *Mining Engr.* 3, 871-878 (1951) October.

An alternate method to the ASTM method D720-46 for the free swelling index of coal is proposed. This substitutes an electric-cone heater and standard 15 cc platinum crucibles for the usual gas burner and silica crucible. Extensive test data from a cone heater, a vertical-tube electric furnace and 7 types of crucibles were obtained for comparison on 39 Canadian and 33 U.S. coals. Data presented in 11 tables and 13 figures indicate that the modification yields the same results as the standard method.

O. P. Brysch

Gas Condensation

"Purifier". CRUDE GAS TO FINISHED PRODUCT. Part 5. *Gas Times* (British) 68, 37-38 (1951) July 13; Part 6, 113-116 July 27; Part 7, 311-313, September 7.

Part 5 briefly discusses the corrosion and scaling of water-cooled gas condensers. Part 6 discusses the present lack of interest in gas dehydration, the distribution economics and costs of operation. The conversion of the many idle benzol plants into dehydration plants is suggested. Part 7 outlines the economics involved in recovery of benzol from coal gas, and the replacement in the gas of the calorific value represented in the benzol and in the diluent gas. The richer the coal gas and the leaner the diluent gas, the less coal will need to be carbonized to replace the calorific values removed as benzol. Formulas, graphs and tabulated data are used to illustrate a means of determining economic limits.

O. P. Brysch

Gasification Reactions

Gorin, E. (assigned to Pittsburgh Consolidation Coal Co.) CONVERSION OF CARBON TO ELECTRICAL ENERGY. U.S. 2,570,543 (1951) October 9.

A high-temperature electrolytic cell is described in which an oxidation-reduction system is maintained. The CO and H_2 formed by the carbon-steam reaction are the reducing agents at the cathode, while atmospheric oxygen is the oxidizing agent at the anode. The cell has an emf of approximately 0.5-0.9 volts and operates at an efficiency of about 75%.

S. Katz

Gas Yields

Myhill, A. R. THE USE OF THE H.E.V. IN MAKING COMPARISONS OF PLANT PERFORMANCE. *Gas Times* (British) 68, 305-306 (1951) September 7.

The author advocates a greater use of Pexton's conception of "hydrocarbon enrichment value"

as a standard of performance for carbonizing plants and for comparing carbonizing results. This hydrocarbon enrichment value (H.E.V.) is defined as the product of the inert-free volume of gas/ton coal, and the excess of its calorific value above that of the blue water gas (318 Btu). In carbonization, it depends only on characteristics of the coal and the carbonizing treatment. Relationships of H.E.V. to coal carbonization "assays," to steaming of charges, and to coal mixtures are discussed.

O. P. Brysch

Hydrocarbon Reforming

Gordon, C. (assigned to Surface Combustion Corp.) PROCESS FOR MAKING FUEL GAS FROM NATURAL GASOLINE AND STRAIGHT RUN GASOLINE. U.S. 2,568,351 (1951) September 18.

Utility gas is produced from a petroleum feedstock by a combination of distillation, catalytic cracking and enriching. First, the feedstock, with Reid Vapor Pressure of 26 pounds or less, is distilled with fractions as follows: (1) a fraction higher than C_6 which is subsequently used for enrichment; (2) a fraction which is essentially C_6 to C_9 hydrocarbons; and (3) a residual fraction which may be used for fuel or for motor fuel. Fraction (2) is catalytically gasified with steam and/or air to form a low-gravity carrier gas that is subsequently admixed with fraction (1) to produce utility gas.

C. H. Riesz

Kelly, L. J. (assigned to Houdry Process Corp.) METHOD OF SEALING HYDROCARBON CONVERSION HOUSINGS. U.S. 2,566,896 (1951) September 4.

This patent describes a sealing method for preventing the passage of reacting gases out through the top of the reaction vessel in concurrent, solid bed hydrocarbon conversion systems. A suitable gaseous sealing medium is introduced at the top of the reaction vessel at a point above the point of entry of the reacting gas, and at a pressure slightly higher than that of the reacting gas. The major portion of the sealing medium passes upward through the vertical conduit and the surge hopper, downward through the adjoining sealed elevator housing, and upward through the vertical conduit which connects the elevator housing to the bottom of the regenerator vessel, at which point the sealing medium passes through the flue-gas disengager pipes and out to the atmosphere.

J. J. Guyer

Low Temperature Carbonization

Martin, H. Z., and Nelson, K. J. (assigned to Standard Oil Development Co.) PRODUCTION OF SOLID FUEL AGGLOMERATES. U.S. 2,560,357 (1951) July 10.

Carbonaceous materials first are carbonized at low temperature (to 850°C) in a fluidized state, and the recovered coke product, together with 3-15% of carbonaceous (pitch) binder is then agglomerated in a rotary kiln at 600-900°F to form 1 to 8 in. spheres of high reactivity and strength. Preheated inert gases, and controlled addition of air and/or oxygen are used in the fluid-carbonization stage, and volatile by-products are recovered.

O. P. Brysch

Oil Gas

HI-BTU OIL GAS. *Am. Gas J.* 175, 27-30 (1951) September.

This is a short review of the various High Btu oil gas processes in the series on "American Gas Fundamentals." The single and twin generator, reverse flow and regenerative-reversible processes are discussed.

H. R. Linden

Purification – Dust Removal

Silverman, L. PERFORMANCE OF INDUSTRIAL AEROSOL FILTERS. *Chem. Eng. Progress* 47, 462-468 (1951) September.

A detail discussion is given on the design, operation, and selection of filters, including a short presentation on theory. Performance data on typical aerosol separators are included.

C. von Fredersdorff

Sulfur Recovery

King, J. G. SULPHUR FROM THE GAS INDUSTRY. *Gas J.* (British) 267, 573-574 (1951) September 5.

The recovery of high-purity sulfur from town gas, for use in sulfuric acid manufacture, is discussed. Proposed improved processes of han-

dling oxide in gas purification include the use of moving-bed and fluidized-bed purifiers. Solvent extraction and volatilization methods of recovering sulfur from spent oxide to provide reactive oxide for re-use require further investigation. Information is given on the distribution of coke oven gas (1947) and of sulfuric acid in Great Britain. Possible fields in which conservation of sulfur resources could be effected are indicated.

C. E. Hummel

PRODUCTION OF SULPHUR FROM WASTE GASES. *Gas World* (British) **134**, 186-187 (1951) September 1.

A description is given of the Australian "Ferralyst" catalytic oxidation process for conversion of inorganic and organic sulfur compounds to elemental sulfur or to sulfur dioxide as desired. Sulfur compounds thus affected include hydrogen sulfide, mercaptans, dimethyl sulfide, thiophene, carbonyl sulfide, and carbon disulfide. Results of the application of this process to the desulfurization of furnace atmospheres and waste gases from the paper and smelting industries are given. Treated gases contained 0.1 to 0 5 g sulfur per ccf. Sulfur recoveries of 98 to 100% were achieved.

C. E. Hummel

Underground Gasification

DISCUSSION ON UNDERGROUND GASIFICATION AT CHESTERFIELD AND GORGAS. *J. Inst. Fuel* (British) **24**, 228-232 (1951) September.

The Institute discussion of the two earlier papers [see *Gas Abstracts* **7**, 93 (1951) June] on large scale pilot tests of underground gasification is reported. Additional Fuel Research Station Laboratory tests on large hewn blocks of caking and weakly caking coals are described in detail. Estimation of heat losses to surrounding rock is described. Brief comments on gas Btu, use of oxygen and pressure, coal rank and carbonizing reactions are given.

O. P. Brysch

Water Gas Costs

Cheetham, H. S. SOME ASPECTS OF WATER GAS MANUFACTURE AND APPLICATION. *Gas World* (British) **134**, 237-241 (1951) September 15.

A detailed account of the construction of generators, carbureters, and auxiliary equipment is given for carburetted water gas plants. The cost of carburetted water was has increased over 100% since 1938 due primarily to the more expensive but inferior quality coke available. Itemized cost lists are included showing a comparison of blue gas and carburetted water gas for the years 1938 and 1948.

C. von Fredersdorff

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Distribution

Kayser, P. NATURAL GAS PIPE LINE CONSTRUCTION AT RECORD LEVELS. *Pipe Line News* **23**, 33-35 (1951) October.

A summary of certificates of public convenience and necessity issued by the FPC by years is presented. Some problems of the industry are stated. Favorable bills now in Congress include one to give right of eminent domain for storage, another to place jurisdiction of lines across public lands in the name of the FPC, and another to forbid the FPC jurisdiction over local distributors operating in one state only.

J. D. Parent

Distribution System Calculator

Clennon, J. P. CALCULATORS SOLVE FLOW PROBLEMS. *Am. Gas Assoc. Monthly* **33**, 19 (1951) October.

The application of an electrical network calculator to the solution of gas distribution problems is discussed. The operation of the calculator for low pressure distribution system calculations is described. The calculator is equally applicable to medium and high pressure system calculators.

B. E. Hunt

Compressors

Koenig, C. F. CENTRIFUGAL COMPRESSORS FOR PIPE LINES. A DISCUSSION

OF THE PRINCIPLES OF OPERATION, PERFORMANCE, AND CONSTRUCTION OF THIS NEWER TYPE OF GAS BOOSTER EQUIPMENT. *Petroleum Engr.* 23 D-9-D-18 (1951) October.

The theory of operation and design of centrifugal compressors is presented in a simple manner. Diagrams are given showing typical performances of centrifugal compression when applied to high pressure gas transmission. A recently designed unit of De Laval is described.

O. T. Bloomer

Gas Conditioning

Berg, C. HYPERSORPTION IN MODERN GAS PROCESSING PLANTS. *Petroleum Refiner* **30**, 241-243, 245-246 (1951) September. *Chem. Eng. Progress* **47**, 585-590 (1951) November.

The use of the hypersorption process in separating gaseous mixtures is reviewed, and proposed flow sheets for several processes, including removal of nitrogen from natural gas, are given.

J. D. Parent

McCarthy, E. L. LOW TEMPERATURE CONDENSATE SEPARATION AND DEHYDRATION OF NATURAL GAS. *Gas* **27**, 121, 122, 124, 125 (1951) October.

Low temperature condensate separation and dehydration units are coming into increased use for processing high pressure natural gas. The units have the advantage of increased condensate recovery, and production of a gas meeting the water content specification for transmission gas. The units are based on the refrigeration effect accompanying the expansion of the gas and on proper handling of gas-hydrates if they are formed. In the article flow diagrams and brief operating data are given for five flow schemes which are currently in use.

O. T. Bloomer

Gas Holders

Banks, D. B. (assigned to Sun Oil Co., Pa.) SYSTEM AND APPARATUS FOR GAS STORAGE CONTROL. U.S. 2,572,799 (1951) October 23.

A wet-type gas holder is described, in which the gas entering and the gas leaving are controlled by an extraneous control-fluid system, which is actuated by valves whose plugs are attached to opposite strands of a vertically mounted endless cable. This cable, fastened to the holder-bell at the proper point, moves to cooperatively open the inlet and close the outlet, or vice versa, at a predetermined volume of gas in the holder.

O. P. Brysch

LP-Gas Handling

Campbell, F. F. TANK TRUCKS, SEMI-TRAILERS AND TRAILERS FOR TRANSPORTATION OF LIQUEFIED PETROLEUM GASES. *LP-Gas*, **11**, 48-54 (1951) September.

The article discusses NBFU pamphlet No. 58, Division III, which deals with standards for the LPG tank truck. Photographs and drawings are included showing approved construction and piping methods.

W. G. Bair

LP-Gases – Storage

Campbell, F. F. STORAGE OF CONTAINERS NOT INSTALLED FOR USE AT FINAL UTILIZATION POINT. *LP-Gas* **11**, 56-58 (1951) November.

This is a continuation of commentary on National Bureau of Fire Underwriters Pamphlet No. 58 as applied to handling of LP-gases.

D. L. Nicol

LP-Gas Mixing

Peacock, P. E. GAS AND AIR MIXING APPARATUS. U.S. 2,570,373 (1951) October 9.

A LP mixing plant using venturi-mixers is described. A constant pressure of uniform Btu gas is made during changing gas load demands without large gas-storage capacity by the use of automatic controls, safety devices, and local sources of current.

B. G. Lang

LP-Gases – Statistics

Coumbe, A. T. and Avery, I. F. TOTAL SALES OF LP-GAS ROSE BY 22.8 PER CENT IN 1950. *Gas Age* **108**, 82-86 (1951) October 11.

Bureau of Mines survey shows: Propane accounted for most gain; largest increase was in Atlantic Coast district; domestic and commercial uses rose 25%; utility companies bought

5% more; industrial consumption gained 33.8%; average prices declined slightly.

Authors' Abstract

Abstractor's Note: For the first time tables, showing LP-gas consumption by districts and by uses, are presented.

D. Gami

Guthrie, W. H. SOURCES, PRODUCTION AND PROPERTIES OF LP-GAS. *LP-Gas* **11**, 34-41, 105-106 (1951) November.

This article gives a semi-technical explanation of characteristics and properties of LP-gas and the methods by which it is produced.

D. L. Nicol

FIRST STATE BY STATE BREAKDOWN GIVES NEW PICTURE OF INDUSTRY. *Butane-Propane* **13**, 45-52 (1951) November.

The 1950 report of the Bureau of Mines covering consumption of LP-gas is presented on an individual state basis. Accompanying the table of sales of LPG by states and principal uses is a brief summary of some of the outstanding increases in consumption of the various regions. Maps showing individual state sales are also included.

R. A. Brown

LP-Gas Uses

Johnson, A. R. SIX PROBLEMS IN SPACE HEATING. *Butane-Propane* **13**, 59-63 (1951) November.

Six factors that must be considered when making a gas heating installation of equipment designed for propane or butane gases are: (1) types of gas space heaters available; (2) types and capacities of gas storage systems; (3) types and construction standards of buildings; (4) estimations of heat losses; (5) safety rules of installation of equipment; and (6) gas demand of the appliance. A discussion of these factors and related problems follows.

R. A. Brown

Natural Gasoline Plant

Cook, T. P. PACKAGED GASOLINE PLANT PROCESSING 5,000,000 CU. FT. OF GAS DAILY. *Oil Gas J.* **50**, 96-97 (1951) October 25.

A package gasoline plant of 5 MMcf/day capacity is described and a complete flow diagram is given. The plant is designed to produce a specification gasoline.

O. T. Bloomer

Odorization

Joachim, J. L. ESPERIENZE SULL' ODORIZZAZIONE DEL GAS. *Rivista dei Combustibili* (Italian) 5, 404-410 (1951) August.

The problem of natural gas odorization, with the aim of detecting leaks in gas lines and in domestic appliances, is discussed. Practical experiences carried on by the Michigan Consolidated Gas Co. are reported, in which routine laboratory checks and comments of field service and street men are correlated.

Author's Abstract

Pipeline Construction

Gump, R. A. WHAT'S WRONG WITH TODAY'S PIPE-LINE CONSTRUCTION CONTRACTS? *Oil Gas J.* **50**, 308, 310, 312-314 (1951) November 8.

At present, there are 142 pipeline contracting firms; they can handle 158 big-inch spreads, 341 trunk spreads and 482 gathering line spreads. Although the Associated General Contractors of America has secured the adoption of a standard contract which is widely used, the Pipeline Contractors Association does not feel that it is practical to have a completely uniform contract in view of such factors as variations in state laws. The latter group does desire the maximum possible uniformity in specifications, conditions, and general provisions.

J. D. Parent

Pipeline Flow

Ferguson, J. W. PIPELINE-FLOW INVESTIGATION. *Am.Gas.Assoc. Monthly* **33**, 16-17 (1951) October.

The experimental set-up and instrumentation used in the pipe line flow investigation (PAR Project NGD-5) is briefly described. Data have been taken on 7 experimental lines, each 100 feet long. One of the lines was of stainless steel, bored and honed to a mirror finish. The line was tested to Reynolds numbers of 36 million. Computation of the large amount of experimental data is progressing. No data or conclusions are given in this article.

O. T. Bloomer

Pressure Regulation

Graham, W. THE USE OF AUTOMATIC REGULATORS IN GASWORKS *Gas J.* (British) **267**, 579-583 (1951) September 5.

A modern type regulator is described which operates on a multiplying principle whereby the small measured impulse is converted to a large corrective force. The operation of this regulator is based upon the fact that the force of a free jet of fluid impinging on an orifice results in a pressure at the orifice equal to that of the jet. This type of regulator has been applied to constant pressure, proportioning, and temperature regulators.

B. E. Hunt

Niederer, E., Jr. EXPANSIBLE-TUBE TYPE REGULATORS SUGGEST POSSIBILITIES IN STATION DESIGN. *Gas Age* **108**, 22-25, 51-52 (1951) October 25.

This regulator has four main parts—body, inner cage, follower ring, and tube (synthetic rubber or Hycar compound). The tube is the only moving part. A simple pilot regulator controls the down-stream line pressure by applying pressure on the outside of the tube and controlling the valve area. The rated capacity is at least 50% greater than conventional types, size for size. These regulators can be used to increase present distribution facilities with the least possible cost.

B. G. Lang

Production

Hinton, C. H. RELATIVE MERITS OF TEST PROCEDURES FOR NATURAL GAS WELLS. *World Oil* **133**, 176-7, 192 (1951) October.

Three methods which have been used for testing the deliverability of gas wells are: (1) open-flow; (2) back pressure open-flow; and (3) deliverability test with gas produced into gathering system. The merits of the three tests are briefly discussed. The necessity for accurate values of the frictional resistance of the producing string, particularly in method 3, is pointed out. The advantage of method 3 is that it eliminates wastage of the gas in carrying out the test.

O. T. Bloomer

Riordan, M. B. SURFACE INDICATING PRESSURE, TEMPERATURE AND FLOW EQUIPMENT. *J. Petroleum Technology* **3**, 257-262, (1951) September.

A subsurface instrument for measuring pressure, temperature, and flow rate in a flowing well is briefly described. Surface indication of these variables is provided. Variable frequency sensing elements are employed for pressure and temperature measurement. These elements employ the principle that the natural frequency of a stretched wire is proportional to the applied tension on the wire. Advantages claimed for this unit are: (1) the surface recording feature increases the fiexibility of taking data and assures more conclusive results; (2) the pressure and temperature elements are very sensitive and make possible more detailed data; (3) the availability of all three factors—pressure, temperature and flow—make it possible to evaluate the effect of a flowing well. The pressure at which a given sand will produce can be determined.

O. T. Bloomer

THE OIL EQUIPMENT MANUFACTURERS AND THEIR CONTRIBUTIONS TO THE OIL AND GAS INDUSTRY. *Oil Gas J.* **50**, 233-235, 238, 240-244, 247-248, 251-255 (1951) November 8.

Advances in equipment for producing oil and natural gas are briefly reviewed.

J. D. Parent

Sulfur Recovery

SULFUR RECOVERY IN CANADA AT SHELL'S JUMPING POUND PLANT. *Oil Gas J.* **50**, 102, 106, 107 (1951) October 25.

Thirty long tons of sulfur are to be extracted per day from waste hydrogen sulfide of the natural gas treating plant. Sulfur dioxide, formed by the combustion of one-third of the hydrogen sulfide of the feed gas, is reacted with the remainder of the hydrogen sulfide over aluminum oxide or natural bauxite catalysts, contained in two catalyst beds. Undesirable reaction products are eliminated in the first bed at a relatively high temperature while maximum conversion is obtained in the second bed at 500° F. Sulfur of 99.9% purity is obtained.

C. E. Hummel

Underground Storage

Gardescu, I. I. STORAGE IN WATER SANDS. *Pipe Line News* 23, 38 (1951) October.

Two failures of gas storage in water sands are noted. Care must be exercised in selection of the sand to be certain of perfect sealing. Wells should be carefully completed and production practice should not allow water coning. An active water drive is considered beneficial in keeping a relatively constant pressure during injection or withdrawal.

J. D. Parent

Gere, J. L. UNDERGROUND STORAGE IN DEPLETED GAS FIELDS. *Pipe Line News* 23, 37-38 (1951) October.

Cities Service Gas Co. has two storage projects underway. The goal is to be about $6.3 million for a storage capacity of 22 billion cu ft and a maximum withdrawal rate of 200 million cu ft per day.

J. D. Parent

Hedrick, J. J. HERSCHER STORAGE PROJECT. *Pipe Line News* 23, 37 (1951) October.

The Herscher gas storage project is located 40 miles south of Joliet and 15 miles from the main line of the Texas-Illinois Natural Gas Pipeline Co. from which it is to receive gas. 15,000 acres have been acquired. Storage is to be in saltwater sands about 100 feet thick. Development cost is estimated at $36 million, and storage capacity will be over 90 billion cu ft. Maximum withdrawal rate is to be 1-1/2 billion cu ft per day.

J. D. Parent

Poe, R. M. STORAGE POOLS PRESENT AND PLANNED HOLD KEY TO WINTER HEATING PEAKS. *Am. Gas J.* 175, 23-26 (1951) October.

Since 1936 underground storage has increased over 15-fold to 600,000,000 Mcf at the end of 1951. Mention is made of the more recent gas storage projects including Oakford Storage Field and Peoples Natural Gas Co. Advantages of underground storage are discussed. An interesting table is included comparing estimated capital costs of various storage methods.

B. G. Lang

Utilization – Chemicals

TEXAS GAS HAS $45 MILLION EXPANSION PLAN BEFORE FPC. *Pipe Line News* 23, 58 (1951) October.

Texas Gas Transmission Co. has applications before the FPC for expansion of facilities at a cost of over $45 million. Included is a plan to supply Mathieson Hydrocarbon Co. with 6,000 Mcf per day on an interruptible basis for stripping of higher hydrocarbons for petrochemical manufacture.

J. D. Parent

Well Corrosion

Shock, D. A., and Sudbury, J. D. PREDICTION OF CORROSION IN OIL AND GAS WELLS. *World Oil* 133, 180-192 (1951) October.

The corrosion of steel in oil and gas wells is believed to be a function of the acidity and volume of produced water. Laboratory investigations of corrosion caused by fatty acids, e.g. acetic acid, and carbon dioxide, are described. Prediction methods for determining corrosion are discussed.

B. E. Hunt

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Kobe, K. A. THE WOHL EQUATION OF STATE APPLIED TO LIGHT HYDROCARBONS. p. 287

ACETYLENE BY THE SCHOCH ELECTRIC DISCHARGE PROCESS. p. 288

CONVERSION TO NATURAL GAS IN NEW ENGLAND UNDER WAY. p. 265

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Carbon Black from Oils

Kramer, B. R. (assigned to Phillips Petroleum Co., Del.) PRODUCTION OF CARBON BLACK FROM HIGH-BOILING AROMATIC OILS OR TARS. U.S. 2,572,734 (1951) October 23.

This invention is said to provide a simplified process such that carbon black can be produced from a broad fraction of heavy cyclic or aromatic refractory cycle stock under conditions of maximum utilization or recovery in useful form. Fractionation and hydrogenolysis are used for producing a fraction of boiling range

400-700° F. This material is passed to a tangential carbon black producing furnace such as described in a previous patent assigned to Phillips. [See *Gas. Abs.* 7, 244 (1951) *November*]

J. D. Parent

Catalysts

Milligan, W. O. (assigned to Houdry Process Corp.) PREPARATION OF CATALYST GEL BEADS BY EMULSIFYING. U.S. 2,568,352 (1951) September 18.

A method for preparing catalyst gel beads is described. The procedure consists in forming an aqueous sol, agitating this sol in a water-immiscible liquid to emulsify the sol into droplets, aging for a time sufficient for the hydrosol to set to a hydrogel, separating, purifying and drying.

C. H. Riesz

Stiles, A. B. (assigned to E. I. du Pont de Nemours & Co.) PREPARATION OF A SINTERED COBALT OXIDE PELLETED CATALYST. U.S. 2,570,882 (1951) October 9.

The patent claims a process using about 3% by weight of vegetable stearin or a lubricant to give a sintered cobalt oxide pelleted catalyst with a crushing strength of 4200 psi.

H. A. Dirksen

Catalytic Cracking

Reynolds, P. M. FACTORS AFFECTING THROUGHPUT PLANT DESIGN, OPERATING CONDITIONS, AND CATALYST PROPERTIES ARE MAIN FACTORS INFLUENCING UNIT YIELDS AND ECONOMICS. *Petroleum Engr.*, 23, C47-52 (1951) October.

Detailed heat balances are presented for coke laydowns of 5.5% and 6.0% in a fluid cracking unit. Variations in throughput, conversion and carbon laydown which affect product distribution are discussed. Catalytic cracking offers means of achieving the most profitable product distribution for a given market structure.

C. H. Riesz

Ryland, L. B. (assigned to Shell Development Co.) PREPARATION OF SILICA-ALUMINA CRACKING CATALYST. U.S. 2,565,886 (1951) August 28.

The preparation of a silica-alumina cracking catalyst is described in detail. The procedure consists in the formation of an acid silica sol from sodium silicate, aging, dilution, neutralization, addition of aluminum sulfate, hydrolyzation, washing and drying as specified.

C. H. Riesz

Coal Hydrogenation

Sellers, F. B. (assigned to Texaco Devel. Corp., N. Y.) PROCESS FOR THE HYDROGENATION OF COAL. U.S. 2,572,061 (1951) October 23.

Coal particles having a size range from about 3/32 in. to about 200 mesh, in a fluid suspension with a hydrocarbon oil, are passed through a pressurized heated zone at above 600° F, thus reducing the particle size of the coal. After enough cooling has taken place to condense some of the oil so that a slurry is formed, the coal particles are hydrogenated in the liquid phase.

C. A. M. Hall

COLCHEM HASSLE. *Chem. Week*, 69, 13 (1951) October 20.

Efforts are still being made to develop a $400 million coal hydrogenation plant in Southern Illinois. An option to 38,000 acres of coal land has been acquired by Colchem Corporation. "Risk capital" from private sources is to be protected by either government-guaranteed prices or by a government agreement to purchase all of the output at a fixed price for a period of years. The project was first offered a year ago as a means of chemical production of aromatics. However, since the plant would produce toluene, xylenes and phenol approximately equal to the total 1950 production, it is obvious that market prices would be depressed. An interesting aside is the cut of 10% in non-military appropriations noted by Congress; this will cause a curtailment in present government research on synthetic liquid fuels.

C. H. Riesz

Fischer-Tropsch Synthesis

Arnold, G. B. and Hess, H. V. (assigned to Texas Co.) METHOD OF SYNTHESIZING GASOLINE HYDROCARBONS. U.S. 2,568,841 (1951) September 25.

In the catalytic synthesis of hydrocarbons from carbon monoxide and hydrogen, the portion

boiling below 245° F contains substantially all of the non-acidic oxygen-containing compounds present as a by-product. Recycling a major portion of this material increases the yield of gasoline.

C. H. Riesz

Dickinson, N. L., Everett, E. F., and Hill, L. R. (assigned to The M. W. Kellogg Co.) PROCESS FOR THE SYNTHESIS OF ORGANIC COMPOUNDS. U.S. 2,568,953 (1951) September 25.

A process for hydrogenating carbon monoxide to produce hydrocarbons and oxygenated compounds is described. An important feature is the reverse shift of carbon dioxide with either hydrogen or methane to form carbon monoxide. The carbon monoxide formed is used to adjust the hydrogen-to-carbon monoxide ratio of the synthesis gas.

C. H. Riesz

Garbo, P. W. and Riblett, E. W. (assigned to Hydrocarbon Research Inc.) STAGEWISE PROCESS FOR THE HYDROGENATION OF CARBON MONOXIDE. U.S. 2,567,932 (1951) September 18.

The synthesis of valuable products from carbon monoxide and hydrogen is conducted in a two-stage fluidized bed. The first stage provides a high temperature (above 700° F), a short residence time (less than 1 second), and less than 10% conversion of the carbon monoxide. The gas then passes to a second zone which provides a lower temperature, longer residence time and completion of the carbon monoxide conversion.

C. H. Riesz

Hofer, E. J., Anderson, R. B., Peebles, W. C. and Stein, K. C. CHLORIDE POISONING OF IRON-COPPER FISCHER-TROPSCH CATALYSTS. *J. Phys. & Colloid Chem.* **55**, 1201-1206 (1951) October.

Lack of reproducibility in preparing precipitated iron Fischer-Tropsch catalysts of high activity is attributed to poisoning by chloride ion. Catalysts containing *beta*-$Fe_2O_3.H_2O$ phase retained large amounts of chloride ion compared with catalysts containing Fe_3O_4. The *beta*-$Fe_2O_3.H_2O$ phase is formed in precipitation by sodium carbonate of solutions containing ferric and chloride ions even when cupric ion is present.

C. H. Riesz

McAdams, D. R., and Segura, M. A. (assigned to Standard Oil Development Co.) PROCESS FOR THE PREPARATION OF CATALYSTS FOR THE CONVERSION OF CARBON OXIDES WITH HYDROGEN. U.S. 2,565,977 (1951) August 28.

An improved iron catalyst for synthesizing hydrocarbons from carbon monoxide and hydrogen is disclosed. The catalyst is prepared by mixing sintered iron pyrites ash with carbon, and then exposing this mixture to oxygen-containing gas at 2200-2500° F. After appropriate crushing, screening, and reduction, the catalyst is ready for use.

C. H. Riesz

Watkins, C. H. (assigned to Universal Oil Products Co.) METHOD OF REMOVING CARBON MONOXIDE FROM HYDROCARBONS. U.S. 2,570,615 (1951) October 9.

The patent claims an iron oxide type catalyst, promoted with potassa and reduced at temperature from 800° F to 1200° F, which selectively hydrogenates carbon monoxide in a mixture containing olefinic hydrocarbon for removal.

H. A. Dirksen

Hydrogenation

Baker, L. L., Jr. and Bernstein, R. B. CARBONYL NICKEL FILMS AS HYDROGENATION CATALYSTS. *J. Am. Chem. Soc.*, **73**, 4434-4436 (1951) September.

Thin nickel films prepared by the thermal decomposition of nickel carbonyl on Pyrex glass were found to be active hydrogenation catalysts. For equimolar mixtures of hydrogen and propylene at 99° F and 176° F, the rates of reaction were accurately correlated by the equation: $-dp/dt = kp^2/(1 + Kp)^2$, where p is the partial pressure of either reactant. This suggests that the mechanism may be competitive adsorption of both reactants with no interference from the product. The films were not reproducible in activity and were slowly poisoned in use. The films are initially free of hydrogen, and thus appear well suited for tracer investigations.

C. H. Riesz

Petrochemicals

Patterson, J. A. and Morgan, J. P. (assigned to Standard Oil Development Co.) SORPTION

OF HYDROCARBONS BY ACTIVATED CARBON. U.S. 2,571,936 (1951) October 16.

A process is described for recovering cyclohexane from a C_6-C_7 hydrocarbon mixture containing cyclohexane together with paraffins, olefins, and aromatic hydrocarbons by means of adsorption on activated carbon.

W. J. Pleticka

Pipeline Techniques

Carlson, R. F. NEW METHOD OF CLEANING AND COATING PIPE LINES IN PLACE. *Oil Gas J.* 50, 293-295 (1951) October 4.

A new cleaning tool consisting of several radially disposed gear-tooth cutting heads powered by an air motor is proving satisfactory for the "in place" cleaning of pipe lines. The unit can also be used to apply a coating to the inside of the pipe after cleaning. The exhaust air from the motor blows the chips and loosened scale from the pipe ahead of the cleaning head.

W. G. Bair

Finney, W. R. PIPELINE TECHNIQUES ADVANCED: TO PROVIDE EFFICIENT, LOW COST TRANSPORTATION OF OIL WHEREVER IT IS NEEDED THROUGHOUT THE WORLD. *Oil Gas J.* 50, 174-176, 258-260 (1951) October 4.

The article reviews past progress and anticipated new developments in pipeline techniques. Of interest is the trend to larger diameter pipelines which can move more oil at a lower initial cost than the small lines. Synthetic pipe made from fiber-glass reinforced plastic may solve most of the corrosion problems now in existence. The expanded use of automatic controls, remote controls, and telemetering has increased the efficiency of the pumping stations. The gas or oil turbine as a prime mover has many advantages in petroleum work.

W. G. Bair

SELECTION OF CONTROL VALVES FOR LARGE CAPACITY LIQUID PIPE LINES. *World Oil*, 133, 230-233 (1951) October.

The paper gives a good analysis of the factors involved in selecting pipe line flow control valves. General recommendations are made.

W. G. Bair

Research Stimulus

Wilson, R. E. THIRD CADMAN MEMORIAL LECTURE. COMPETITIVE AND CO-OPERATIVE RESEARCH IN THE AMERICAN PETROLEUM INDUSTRY. *J. Inst. Petroleum* (British) 37, 407-425 (1951) August.

A brief history is given of major research developments in the petroleum field, followed by an enumeration of the various types and groups of research, and the patent and licensing practices that add impetus to the research. An optimistic, encouraging view is given of the problems to be solved and the threats to research that must be overcome.

H. A. Dirksen

7. ANALYTICAL METHODS AND TESTS

Air Pollution

Kear, R. W. THE INFLUENCE OF CARBON SMOKES ON THE CORROSION OF METAL SURFACES EXPOSED TO FLUE GASES CONTAINING SULPHUR TRIOXIDE. *J. Applied Chem.* (British) 1, 393-399 (1951) September.

This article presents the results of a continuation of the work on determining the effect of carbon smoke on the corrosions of metal surfaces exposed to fuel gases containing SO_3. An investigation of filtered and unfiltered smoke-laden gases was made to determine the mechanism of the SO_3 removal. It was found, also, that as the smoke concentration was increased from zero, there was an initial increase in corrosion.

E. F. Searight

Sittenfield, M. THE CONTROL OF AIR POLLUTION IN THE CHEMICAL INDUSTRY. *Chem. Eng. Progress*, 47, 481-483 (1951) September.

A summary of the basic considerations—legal and social, analytical, economical, and engineering—of air pollution and its control is presented. Several examples of industrial air-pollution control methods are given.

J. J. Guyer

Wittingham, G. THE INFLUENCE OF CARBON SMOKES ON THE DEW-POINT AND SULPHUR TRIOXIDE CONTENT OF

FLAME GASES. *J. Applied Chem.* (British) **1**, 382-388 (1951) September.

An experimental technique which has been used for determining the effect of carbon smokes on the dew point and sulfur trioxide content of gases is described. It was found that for small concentrations of carbon, there was little change in SO_3 content of the gases, but for carbon smoke concentrations over 0.14 mg/l the reduction in SO_3 was appreciable.

E. F. Searight

CO Determination

Main-Smith, J. D. and Earwicker, G. A. (assigned to the U. K., England) DETECTION OF CARBON MONOXIDE BY PALLADOUS SULFITE AND/OR PALLADOSULFITES. U.S. 2,569,895 (1951) October 2.

Carbon monoxide in air or other gases is detected or quantitatively determined by passage through a tube containing simple or complex sulfites of palladium. This reagent, impregnated on silica gel, turns from yellow to brown in the presence of carbon monoxide. Contaminants in the sample which interfere with the test are first removed by unimpregnated silica gel.

C. E. Hummel

Industrial Hygiene – Arsine

Schrenk, H. H. INDUSTRIAL HYGIENE. ARSINE, FREQUENTLY OVERLOOKED AS AN INDUSTRIAL POISON, HAS CAUSED NUMEROUS CASES OF POISONING AND A NUMBER OF DEATHS. *Ind.Eng.Chem.* **43**, 141A-142A (1951) October.

Because of no warning properties and of absorption of fatal amounts before symptoms appear, arsine is an extremely hazardous industrial poison. Four studies of accidental poisonings from the gases of certain metallurgical and chemical processes are discussed.

O. P. Brysch

Infrared Methods

Simard, R. G., Hasegawa, I., Bandaruk, W., and Headington, C. E. INFRARED SPECTROPHOTOMETRIC DETERMINATION OF OIL AND PHENOLS IN WATER. *Anal.Chem.* **23**, 1384-1387 (1951) October.

The sample is brominated, the bromides extracted from the water by carbon tetrachloride, and the phenol content (down to 0.001 ppm) and oil content (down to 0.1 ppm) determined by measurement of optical density at the proper wave length.

I. Ladany

Moisture in Gas

Boyle, J. R. (assigned to Illinois Testing Laboratories, Inc.) DEW POINT MEASURING APPARATUS AND METHOD. U.S. 2,566,-307 (1951) September 4.

This invention relates to two modifications of an apparatus for the determination of the water vapor content of gases. In the first modification, gas is compressed into a vessel containing a mirrored cup maintained at constant temperature until the dew point pressure is reached. This is detected by the presence of condensed water on the mirror. In the second modification, small charges of the sample gas are introduced in successive operations into a reservoir where they are successively "blown down" to atmospheric pressure. The water vapor content is then determined from the lowest initial pressure which is effective in producing the fog.

O. T. Bloomer

Campbell, J. M. and Laurence, L. L. MEASUREMENT OF WATER-VAPOR CONTENT OF GASES DEHYDRATED WITH TRIETHYLENE GLYCOL. *Oil Gas J.* **50**, 93-94 (1951) October 18.

Experiments carried out with the Bureau of Mines high pressure dew-point tester on gases leaving triethylene glycol dehydration units indicate that this tester will give satisfactory results for these gases, provided the glycol entrainment losses are negligable. The prime error in the use of the tester is stated to be a human one. Use of high concentrations of triethylene glycol reduces the glycol loss and in turn gives more reproducable dew points.

O. T. Bloomer

Oxygen in Coal

Campanile, V. A., Badley, J. H., Peters, E. D., Agazzi, E. J. and Brooks, F. R. IMPROVED METHOD FOR DETERMINATION OF OXYGEN. *Anal.Chem.* **23**, 1421-1426 (1951) October.

The Schütze-Unterzaucher method for the determination of oxygen, by reduction over carbon at 1120° C., has been studied for the pur-

pose of developing a reliable method for routine use. A convenient, unitized apparatus has been designed, and a procedure which is applicable to a wide variety of materials has been developed. Hydrogen was found to interfere seriously with the determination of small amounts of oxygen in hydrocarbon mixtures, by virtue of its slow reaction with iodine pentoxide; this interference was surmounted by removal of the hydrogen by diffusion through a heated palladium thimble. The resulting method, while surmounting the principal interferences encountered in the original method, retains the simple and sensitive iodometric titration in the concluding step. Results are presented for the analysis of a variety of materials to illustrate the wide scope of the method.

Authors' Abstract

Dundy, M. and Stehr, E. DETERMINATION OF OXYGEN IN ORGANIC MATERIALS BY MODIFIED SCHÜTZE - UNTERZAUCHER METHOD. *Anal.Chem.* 23, 1408-1413 (1951) October.

A gravimetric procedure whereby the liberated CO_2 is weighed after the iodine is absorbed enables this modification of the Schütze-Unterzaucher method to avoid errors due to interference by hydrogen. An improved apparatus is described, and results on pure compounds, hydrocarbons, and sulfur compounds are given.

O. P. Brysch

Holowchak, J. and Wear, G. E. C. DIRECT DETERMINATION OF OXYGEN IN ORGANIC COMPOUNDS. *Anal.Chem.* 23, 1404-1407 (1951) October.

The Unterzaucher carbon-reduction procedure for direct determination of oxygen in organic substances has been modified by substituting a manometric measurement of CO_2 for the iodine pentoxide reaction with CO. The hydrogen interference encountered with the latter reaction is eliminated, especially for low-oxygen content materials, as shown by results on pure compounds.

O. P. Brysch

Spectrometric Methods

Hansen, J., Skiba, P., and Hodgkins, C. R. DETERMINATION OF IRON IN USED LUBRICATING OILS BY SPECTROCHEMICAL ANALYSIS. *Anal.Chem.* 23, 1362-1365 (1951) October.

A rapid and accurate method for the quantitative determination of a wide range of iron content in used lubricating oils is useful when extensive engine wear or performance studies are being undertaken. A spectrochemical procedure capable of yielding accurate analyses of 3 to 3000 ppm of iron in used lubricating oils is described. A fixed quantity of internal standard is added to a weighed amount of sample, and 10 drops of the resulting mixture ashed in the cavity of an electrode. The electrode is designed so that the cavity wall can easily be removed to expose the ash on a conical tip. Satisfactory results have been obtained using as little as 5 grams of sample. The over-all accuracy of the method is within approximately $\pm$ 5% of the amount present.

Authors' Abstract

Owen, L. E. GAS TRANSPORT ELECTRODES. *J. Optical Soc. Am.* 41, 709-711 (1951) October.

The use of a hollow electrode form with the employment of a gas stream to introduce a sample into a spectral excitation column is discussed. Three uses are proposed: (1) the direct introduction into the excitation gap of contaminated gas samples such as dust-laden air; (2) the direct introduction of special atmospheres into an excitation column to utilize their effect on spectral excitation; (3) the gas transportation of atomized solutions into an excitation gap.

Author's Abstract

Shepherd, M., Rock, S. M., Howard, R., and Stormes, J. ISOLATION, IDENTIFICATION, AND ESTIMATION OF GASEOUS POLLUTANTS OF AIR. *Anal.Chem.* 23, 1431-1440 (1951) October.

A method of concentration of gaseous impurities in air has been devised, and the resulting concentrate was run on the mass spectrometer. Although a complete analysis could not be obtained of the contaminants of Los Angeles County air during a smog, a large portion was identified as being hydrocarbons and hydrocarbons combined with oxygen, nitrogen, and chlorine. Minimum concentrations reported were 0.001 ppm pollutant in air.

D. V. Kniebes

Sulfur Determination

Girelli, A. and Siniramed, C. DETERMINAZIONE DELLO ZOLFO TOTALE NEI DISTILLATI LEGGERI DI PETROLIO MEDIANTE COMBUSTIONE ALLA LAMPADA E TITOLAZIONE POTENZIOMETRICA. *Rivista dei Combustibili* (Italian) 5, 411-415 (1951) August.

ASTM D 90-50T apparatus for sulphur determination in petroleum light distillates by lamp combustion has been modified in order to enable automatic potentiometric titration of Na_2CO_3 solution after lamp combustion of sample.

Authors' Abstract

Raimondo, E., Siniramed, C. and Gianoli, E. CONTRIBUTO ALLA DETERMINAZIONE DELLO ZOLFO ORGANICO NEI GAS LIQUEFATTI DI PETROLIO. *Rivista dei Combustibili* (Italian) 5, 395-403 (1951) August.

Different methods used for the determination of organic sulphur in liquefied petroleum gases are reviewed. A new apparatus is described, which is particularly useful for the determination of organic sulphur in liquefied petroleum gases. Very small percentages of sulphur can be determined, by burning considerable amounts of gas; the trouble caused by the formation of relatively large quantities of condensed water is overcome by a simple device.

Authors' Abstract

Abstractor's note: The reference listed as (12) should read Hakewill, H. and Rueck, E. M., *A.G.A. Proceedings* (1946) 28, 529.

C. E. Hummel

Uhrig, K. and Levin, H. DETERMINATION OF THE FREE SULFUR IN GASOLINE. *Anal. Chem.*, 23, 1334-5 (1951) September.

The gasoline sample is shaken with oleic acid and mercury, and is compared (by transmitted light) with freshly shaken standard mercury sulfide suspensions. Hydrogen sulfide must be removed before analysis of the gasoline. A determination requires less than ten minutes.

C. E. Hummel

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Powell, S. T. SIMPLIFIED PROCESS FOR DETERMINING STEAM PURITY. p. 294

Swartzman, E. and Behnke, G. C. USING ELECTRIC FURNACES AND HEATERS TO DETERMINE THE FREE-SWELLING INDEX OF COAL. p 274

8. GENERAL AND PHYSICAL CHEMISTRY

Catalyst Structure

Smith, D. P. CATALYSIS BY METAL POWDERS. (Letter to the Editor) *J. Applied Phys.* 22, 1291-1292 (1951) October.

It is believed that massive metals in strained condition owe certain of their catalytic properties to widened lattice intervals. The author lists the reasons for regarding metal powders as small masses in similar strained conditions.

I. Ladany

Combustion Velocities

Barusch, M. R. and Payne, J. Q. RELATION OF OCTANE NUMBER TO COOL FLAME FORMATION. *Ind.Eng.Chem.* 43, 2329-2334 (1951) October.

This article discusses the stabilization of a cool flame in a straight tube, and the relation between octane numbers and cool flame formation. The equilibrium position of the stabilized flame was found to be a function of temperature, flow rate, and octane number. An increase in temperature or a decrease in fuel flow rate caused the stable flame position to shift toward the fuel inlet. Increasing the octane number caused a shift away from the fuel inlet.

E. F. Searight

Conan, H. R. and Linnett, J. W. BURNING VELOCITY DETERMINATIONS. PART V. THE USE OF SCHLIEREN PHOTOGRAPHY IN DETERMINING BURNING VELOCITIES BY THE BURNER METHOD. *Trans. Faraday Soc.* 47, 981-988 (1951) September.

The dynamic Schlieren method of determining burning velocities is discussed. Reasons for using the Schlieren cone rather than the lumi-

nous cone are given, together with photographs of Bunsen flames containing magnesium oxide particles. The particle paths indicate that there is very little divergence of flow until the outer edge of the Schlieren cone is reached. The luminous cone is shown to lie outside the Schlieren cone. Burning velocities determined from Schlieren photographs of Bunsen burner flames are given for the ethylene-air system.

E. F. Searight

Linnett, J. W., Pickering, H. S. and Wheatley, P. J. BURNING VELOCITY DETERMINATIONS. PART IV.—THE SOAP BUBBLE METHOD OF DETERMINING BURNING VELOCITIES. *Trans. Faraday Soc.* **47**, 974-980 (1951) September.

Equipment for determining burning velocities by the soap bubble method is described and experimental results for the acetylene-air and the ethylene-air systems are given. These results are compared with velocities obtained by other methods. A discussion of possible errors inherent in the soap bubble method is given with special emphasis on possible diffusion through the soap bubble.

E. F. Searight

Pickering, H. S. and Linnett, J. W. BURNING VELOCITY DETERMINATIONS. PART VI. THE USE OF SCHLIEREN PHOTOGRAPHY IN DETERMINING BURNING VELOCITIES BY THE SOAP BUBBLE METHOD. *Trans. Faraday Soc.* **47**, 989-992 (1951) September.

Since only mixtures near the stoichiometric point produce luminous flames bright enough to be photographed directly in the soap bubble method for determining burning velocities, the authors decided to investigate the use of Schlieren photography. Good Schlieren photographs were obtained over a wide range of concentrations. This soap bubble method was used as a second approach to check the values obtained by the Bunsen burner method. A comparison of values obtained by the two methods shows good agreement for the ethylene-air system.

E. F. Searight

Equation of State

Kobe, K. A. and Rosenberg, H. E. THE WOHL EQUATION OF STATE APPLIED TO LIGHT HYDROCARBONS. *Petroleum Engr.* **23C**, 35-38 (1951) October.

The three constants of the Wohl equation of state were determined for methane, ethane, propane, n-butane, iso-butane, n-pentane, nitrogen, water, and carbon dioxide using the critical temperatures, critical pressure and $Vc^1 = \frac{RTc}{3.75\,Pc}$ instead of the critical volume. A comparison of calculated and observed pressures for each of these gases is given. In general the equation is accurate to 1% at volumes somewhat greater than the critical volume. Below the critical volume the errors became large.

O. T. Bloomer

Equilibria in Extraction

Brancker, A. V. GRAPHICAL REPRESENTATION OF EXTRACTION PROCESSES. *International Chem. Eng. & Process Ind.* (British) **32**, 482-484 (1951) October.

Graphical methods of representing equilibria in ternary and quaternary liquid systems are described in this article, and practical examples based on the equilateral triangle and regular tetrahedron are discussed. These graphical representation methods can be extended to the design of extraction equipment.

Author's Abstract

Fluid Flow Patterns

Rogers, F. T., Jr. and Schilberg, L. E. DETECTION OF SMALL FLUID FLOWS BY MEANS OF P^{32}. *Nucleonics* **9**, 47-51 (1951) October.

A comparison was made of various methods of studying fluid flow patterns through unconsolidated porous media. Methods compared included radioactive tracers, visual observations of dyes and thermal measurements. Average deviations between theory and experiment were 150% for visual detection, 32% for thermal, and 11% for radioisotopic.

S. Katz

Hilsch-Tube

Scheper, G. W., Jr. THE VORTEX TUBE—INTERNAL FLOW DATA AND A HEAT TRANSFER THEORY. *Refrig. Eng.* **59**, 985-9, 1018 (1951) October.

Results are presented of an experimental investigation of the Hilsch (or Ranque) vortex tube

which produces hot and cold streams simultaneously from a source of compressed gas. Basic flow patterns and temperatures and pressure traverses obtained at several sections are reported. The author advances a theory for the action of the tube based on observed flow pattern, the concept of total and static temperatures and a heat transfer mechanism.

O. T. Bloomer

Hydrocarbon Viscosities

Doolittle, A. K. STUDIES IN NEWTONIAN FLOW. I. THE DEPENDENCE OF THE VISCOSITY OF LIQUIDS ON TEMPERATURE. *J. Applied Phys.* **22**, 1031-1039 (1951) August.

An empirical viscosity-temperature relationship is developed for the n-alkanes of molecular weights ranging from 72 to 900. This equation is based on measurements over a range of temperatures from 10°C to 300°C The deviations from the measured viscosities of values calculated according to these equations are within the accuracy of the measurements.

N. L. Carr

Inflammability

Jones, E. SUPPRESSION OF FLAME IN EXPLOSIVE SYSTEMS. *J. Applied Chem.* (British) **1**, 411-413 (1951) September.

The suppression of flame in explosive mixtures is discussed from the viewpoint of Le Chatelier's rule. This approach leads to the conclusion that the best inhibitors are the heavy hydrocarbons, a conclusion which is supported by experimental evidence.

E. F. Searight

Phase Equilibria

Brooks, W. B., Gibbs, G. B. and McKetta, J. J. MUTUAL SOLUBILITIES OF LIGHT HYDROCARBON-WATER SYSTEMS. *Petroleum Refiner* **30**, 118-120 (1951) October.

Experimental compositions of the co-existing liquid phases of the n-butane-water system are presented at pressures from 1000 to 10,000 psia and at temperatures of 100° F and 220° F. These data are compared with data previously reported in the literature at the same pressure and temperature conditions for methane, ethane and propane.

Authors' Abstract

Xenon

Beattie, J. A., Barriault, J., and Brierley, J. S. THE COMPRESSIBILITY OF GASEOUS XENON. I. AN EQUATION OF STATE FOR XENON AND THE WEIGHT OF A LITER OF XENON. *J.Chem.Phys.* **19**, 1219-1221 (1951) October.

The compressibility of xenon (containing 0.14 mole % krypton) has been measured from 16.65° (the critical temperature) to 300° over the density range of 1 to 10 moles per liter. The constants of the Beattie-Bridgeman equation of state for the sample used and for pure xenon have been determined from these measurements.

O. T. Bloomer

Beattie, J. A., Barriault, J., and Brierley, J. S. THE COMPRESSIBILITY OF GASEOUS XENON. II. THE VIRIAL COEFFICIENTS AND POTENTIAL PARAMETERS OF XENON. *J. Chem. Phys.* **19**, 1222-1226 (1951) October.

The second and third virial coefficients of xenon were determined from the above compressibility measurements. These values are compared with values calculated by statistical mechanics using the Lennard-Jones potential with parameters determined from the experimental compressibility measurements. The representation of the second virial coefficient is quite satisfactory. The agreement for the third virial diverges rapidly at the critical temperature.

O. T. Bloomer

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Dryden, I. G. C. THE ULTRA-FINE PHYSICAL STRUCTURE OF BRIGHT BITUMINOUS COALS. p 272

9. ORGANIC CHEMISTRY

Acetylene Production

ACETYLENE FROM HYDROCARBONS BY THE SCHOCH ELECTRIC DISCHARGE PROCESS. *Univ. of Texas Publ. No.* **5011**, (1950) June 1.

Hydrocarbon liquids or gases are partially converted to acetylene by electrical discharge pass-

ing through the stream of feed gas in this process. To make 1 lb of acetylene 1.6 lb of a gas (80-100% methane) or 2.15 lb of liquid (vaporizable hydrocarbons) are required. Economical operation of a gas-feed plant requires the recovery of unreacted methane from the off gas. If this were done efficiently, the calculated cost of gas per pound of acetylene would be 0.9 cents. The amount of electrical energy needed to make one pound of acetylene is 4.89 kwhr if a gas feed is used, 3.55 kwhr if a liquid feed is used. Extensive equipment specification and cost data are included.

C. A. M. Hall

Alkylation - Isomerization

Pines, H., Huntsman, W. D. and Ipatieff, V. N. ISOMERIZATION ACCOMPANYING ALKYLATION. VII. REACTION OF BENZENE WITH METHYLCYCLOPROPANE, ETHYLCYCLOPROPANE AND WITH DIMETHYLCYCLOPROPANES. *J. Am. Chem. Soc.* 73, 4343-4347 (1951) September.

Methylcyclopropane reacted with benzene in the presence of hydrogen fluoride to give 2-phenylbutane. Ethylcyclopropane reacted with benzene to give 63% of 2-phenylpentane and 37% of 3-phenylpentane in the presence of either hydrogen fluoride, sulfuric acid or aluminum chloride. In the presence of hydrogen fluoride, 1,1-dimethylcyclopropane reacted with benzene to form t-amylbenzene; while 1,2-dimethylcyclopropane gave t-amylbenzene and smaller amounts of 2- and 3-phenylpentane and 2-phenyl-3-methylpentane. The infrared spectra of six amylbenzenes are reported.

C. H. Riesz

Aromatics Production

Corson, B. B. and Kutz, W. M. (assigned to Koppers Co., Del.) PREPARATION OF CUMENE. U.S. 2,572,701 (1951) October 23.

An improved process is claimed for condensing propylene with benzene in the presence of relatively concentrated sulfuric acid (80%-96% by weight) to form cumene (isopropylbenzene).

W. J. Pleticka

Heinemann, H., Schall, J. W. and Stevenson, D. H. APPLICATION OF HOUDRIFORMING TO PRODUCTION OF AROMATICS AND HIGH-OCTANE MOTOR GASOLINE. *Oil Gas J.* 50, 166-173 (1951) November 15.

Data for a few feed stocks are presented and discussed for the production of aromatics and high-octane gasoline.

W. J. Pleticka

Weizmann, C., Bergmann, E., Huggett, W. E., Steiner, H., Sulzbacher, M. AROMATIZING CRACKING OF HYDROCARBON OIL. PROCESS DATA AND MECHANISM. *Ind. Eng. Chem.* 43, 2312-2326 (1951) October.

Aromatic hydrocarbons have been known to be by-products of cracking processes; from a study of the mechanism of their formation by cracking, it was hoped to develop a method for their industrial production from petroleum or petroleum fractions. The present four papers show that the high-temperature aromatization of hydrocarbons proceeds largely through degradation to small unsaturated units, outstanding among them butadiene, and through subsequent "diene reactions" leading to hydroaromatic hydrocarbons which are eventually dehydrogenated to the aromatics. For naphthenic charging stocks, direct thermal dehydrogenation represents a second source of aromatic hydrocarbons. A process is described which converts a nonaromatic (or only partly aromatic) charging stock into liquid and gaseous products. The gases are predominantly unsaturated (ethylene, propylene, butylene, isobutylene and some butadiene), and the liquid product is more than 90%, and up to 98% of aromatic nature and largely free of sulfur and nitrogen, even in cases in which the charging stock contained organic compounds of these elements. Separation and purification of the constituents are, therefore, comparatively easy; one obtains the whole range of aromatics from benzene to the most complicated polycyclics, practically independent of the molecular size of the charging stock. The process which thus yields practically all the hydrocarbons which the modern organic chemical industry requires can supplement and/or replace both the usual cracking processes and the coal tar industry, as far as they aim at the production of chemicals. It is being successfully applied at the present time on an industrial scale in England.

Authors' Abstract

PLATFORMING SETS BENZENE PACE. *Chem. Engr.* 58, 234-244 (1951) October.

Platforming installations are either operating or being built at 21 locations; six are designed for aromatic production, the remainder for high-octane gasoline. By the end of 1952, benzene from these aromatic units will be at the rate of 50 million gallons yearly. The largest unit at Houston alone will turn out 19 million gallons per year. Other benzene processes are operated by Sun Oil (13 million gallons), Atlantic Refinery (7 million), Shell Oil (12 million), Pan-American and Standard Oil (Indiana). C. H. Riesz

Carbon Disulfide

Folkins, H. O., Porter, C. A., Miller, E., and Hennig, H. (assigned to The Pure Oil Co.) PREPARATION OF CARBON DISULFIDE. U.S. 2,568,121 (1951) September 18.

Carbon disulfide is prepared by heating a mixture of sulfur vapor and hydrocarbon gas of high methane content to 1100° F in the presence of silica or alumina-type catalysts. About 90% of the theoretical amount of carbon disulfide (based on the hydrocarbon gas charged) was recovered. C. E. Hummel

Ethylene Recovery

Aicher, A. A., (assigned to Petrocarbon Ltd., England) SEPARATION OF GASEOUS MIXTURES AT LOW TEMPERATURES. U.S. 2,567,461 (1951) September 11.

A mixture of hydrocarbon gases is liquefied, and fractionated for recovery of ethylene and ethane, by refrigerating with liquid ethylene at several stages of temperature and pressure.

O. P. Brysch

Kniel, L. (assigned to The Lummus Co., N. Y.) PRODUCTION OF ETHYLENE. U.S. 2,573,341 (1951) October 30.

The principal object of this invention is to recover substantially pure ethylene from gaseous mixtures (as refinery off-gases) which contain large proportions of methane and hydrogen by the use of a rectifier-absorber tower wherein substantially all of the methane and hydrogen may be removed overhead. The gaseous mixture is passed in counter-current relation to a hydrocarbon absorption oil, which is largely aromatic, under a substantial super-atmospheric pressure, and at a temperature high enough to remove most of the methane from the ethylene-rich absorbent liquid which leaves the bottom of the tower.

C. A. M. Hall

Sherwood, P. W. PRODUCTION OF ETHYLENE FROM PETROLEUM SOURCES: PART I. *Petroleum Refiner* 30, 220-225 (1951) September.

Ethylene production from petroleum sources has risen from 66 million pounds in 1943 to 1180 million pounds in 1948. Chemistry of ethylene production by pyrolysis is described including a plot of equilibrium constants for the reaction: $C_2H_6 \rightarrow C_2H_4 + H_2$. Contact time, temperature, pressure, and catalysts are discussed as operating variables. Mention is made of production at Leuna, Germany, of ethylene by partial oxidation of ethane.

B. G. Lang

Pyridine Synthesis

Teter, J. W. (assigned to Sinclair Refining Co.) PROCESS FOR PREPARING NITRILES AND PYRIDINES. U.S. 2,567,254 (1951) September 11.

Pyridines and aliphatic nitriles are prepared by passing preheated vapors of butadiene and ammonia over a reduced cobalt or nickel oxide catalyst at temperatures of 500 to 700° F and pressures above 500 psi.

O. P. Brysch

Sulfocarbon Uses

Gamson, B. W. (assigned to Great Lakes Carbon Corp.) METHOD OF PRODUCING CARBON, SULFUR AND HYDROGEN COMPOSITIONS. U.S. 2,569,095 (1951) September 25.

Raw infusible cokes, produced by pyrolysis of petroleum or pitch, are converted into products useful in production of carbon disulfide by first dissolving them at 300 to 500° F in heavy petroleum or coal tar hydrocarbons, then adding elemental sulfur in amounts stoichiometrically equivalent to at least 60% of the hydrogen content of the solution, heating at 450 to 625° F to form a solid, and calcining the solid at 625-1800° F to form an infusible carbon-hydrogen-sulfur composition. (See *Gas Abs.* 7, 160 (1951) August). O. P. Brysch

Thiophene

Sager, W. F. (assigned to The Texas Co.) PRODUCTION OF THIOPHENE COMPOUNDS FROM A SULFUR DIOXIDE AND HYDROGEN SULFIDE MIXTURE. U.S. 2,570,722 (1951) October 9.

Compounds containing a thiophene nucleus are produced by passing a mixture of hydrogen sulfide and sulfur dioxide with acyclic hydrocarbons over metallic oxide, metallic sulfide or silica-type catalysts at 700 to 1400° F. Thiophene of 95% purity is obtained in 70% yields (based on the hydrocarbon charged).

C. E. Hummel

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

TEXAS GAS HAS $45 MILLION EXPANSION PLAN BEFORE FPC. p 280

10. CHEMICAL ENGINEERING

Acetylene Reactions

Miller, S. A. HANDLING ACETYLENE UNDER PRESSURE IN CHEMICAL REACTIONS. *Intern. Chem. Eng. Process Ind.* (British) **32**, 476-478 (1951) October.

Compressed acetylene was handled successfully by the German chemical industry, which stated three major precautions: (1) elimination of factors known to initiate decomposition; (2) reduction of violence of explosions when these occur; and (3) use of a plant designed to withstand explosions of reduced violence. The German claims, critically examined, reveal that safe operating conditions cannot be predicted. The main positive precaution is the elimination of all possible sources of initiation by preventing any hot spots where local temperatures exceed 932° F or possibly even 662° F. Numerous tests show the inadequacy of specific German recommendations in regard to valve construction, non-return valves, tube bundles and contact with copper.

C. H. Riesz

Agglomeration

AGGLOMERATION. *Chem. Eng.* **58**, 161-174 (1951) October.

Agglomeration, or size enlargement, is discussed as a unit operation in chemical engineering practice. Useful applications are found in pelletizing chemicals, catalysts, carbon blacks, and metal powders, or in briquetting chemicals, in pressing bricks and solid fuels, in extruding catalysts and refractories, and in sintering ores. An important step in beneficiating taconite is to agglomerate the concentrate to make sizes useful for blast furnace charges.

C. H. Riesz

Blast Furnace Reactions

Killian, S. T. A CORRECTED CO/CO_2 RATIO FOR BLAST FURNACES. *J. Metals* **3**, 742-745 (1951) September.

The normal CO/CO_2 ratio of blast-furnace gas has proved worthless as an index of blast-furnace performance. However, when corrected to a hydrogen-free basis, and when CO_2 from the limestone flux (calculated from 24-hr carbon and material balances) is deducted, this ratio gives a closer expression of the efficiency of the gasified carbon of the fuel in reducing the ore, and shows changes in performance quicker than any other method. Methods of calculation and a furnace comparison are given.

O. P. Brysch

Fluidizer Control

Berg, C. H. (assigned to Union Oil Co. of California) LEVEL CONTROL. U.S. 2,568,379 (1951) September 18.

The patent suggests a method for controlling the level of solids in a fluidizing vessel in which the actuating mechanism is a suspended cone through which the solids are discharged. The weight of the cone is relayed to an electric or pneumatic controller, which in turn positions an outlet slide valve in the solids discharge line.

C. von Fredersdorff

Gas-Solid Fractionation

Reid, A. F. COUNTERCURRENT SOLID-GAS FRACTIONATION PROCESS. *Ind. Eng. Chem.* **43**, 2151-2153 (1951) September.

The principle of the differences in vapor pressure of components that are capable of existing in the gas-solid phase is used for the separation

of these components. Although the conventional liquid-vapor distillation method is more economical, the new method may be used when the boiling points at standard conditions of the components to be separated are so close that the ordinary method is impractical. This article describes the pilot apparatus that was used, (a rotating helix giving a progression of hot and cold zones) and some experimental data on a benzene-cyclohexane separation.

S. Mori

Nitric Oxides

James, I. J. (assigned to Union Oil Co. of California) PROCESS FOR PRODUCING AND SEPARATING NITROGEN OXIDES U.S. 2,568,396 (1951) September 18.

Separation of nitrogen dioxide and tetroxide from nitric oxide in gases from ammonia oxidation is effected by adsorbing the former on granular charcoal in the top section of a vertical column, rectifying the down-flowing charcoal with nitrogen dioxide in a middle charcoal chamber to desorb any nitric oxide, oxygen, or nitrogen, then finally stripping this saturated charcoal by indirect heat exchange at 400-600° F in the bottom section, and recovering the dioxide and tetroxide. The stripped charcoal is lifted by the lean gases, (NO, N_2 and O_2), cooled, and returned to the top of the tower. The nitric oxide is separately oxidized to dioxide and tetroxide, which are returned to the system.

O. P. Brysch

Pebble Heater

Hall, D. S. (assigned to Phillips Petroleum Co.) PEBBLE HEATER BAFFLE. U.S. 2,565,811 (1951) August 28.

An improvement in pebble heater construction is described, comprising an assembly of internal baffles to improve the solid and gaseous distribution inside the heating vessel.

C. von Fredersdorff

Plant Design

Beek, J., Jr. and Singer, E. A PROCEDURE FOR SCALING-UP A CATALYTIC REACTOR. *Chem. Eng. Progress* **47**, 534-540 (1951) October.

The production of toluene by catalytic dehydrogenation of methylcyclohexane was studied in laboratory tests to obtain basic information. Selection of a multitube heat exchanger heated by flue gas at 1200° F fixed the type of reactor design. Variables of production rate for various tube sizes, recycle ratios, feed compositions, tube lengths and pressure drops could then be considered. A single tube prototype of the commercial reactor then can be constructed for pilot plant studies.

C. H. Riesz

Gore, W. L. STATISTICAL DESIGN IN CHEMICAL EXPERIMENTATION. *Ind. Eng. Chem.* **43**, 2327-2328 (1951) October.

Statistical techniques that are most useful in non-routine experimental work become important because of the unusual importance of research in chemical enterprizes. Most chemists are not aware of the value of statistical design principles in planning experiments. A general scheme, which is useful for investigating a multivariate phenomenon, is described. Using these principles, with a minimum quantity of data, the major variables can de defined for further study.

D. L. Nicol

Holroyd, R. SOME ASPECTS OF SEMI-TECHNICAL SCALE EXPERIMENTATION IN CHEMICAL INDUSTRY. *Chem. & Ind.* (British), 782-787 (1951) September 22.

Scaling-up of process information to full-scale industrial installations is discussed in non-mathematical terms. Analogies are made between a glass model comprising silica chips, water and air, and small-scale tests of a flow system comprising catalyst, di-isobutylene, and hydrogen. It is emphasized that "semi-technical research" is not merely an extension of a laboratory process, but rather must be closely linked to the full-scale plant as a proving ground for the elements of operation and principles of control to be used in the large scale.

C. H. Riesz

Pressure Vessels

Wolosewick, F. E. SUPPORTS FOR VERTICAL PRESSURE VESSELS. PART II. *Petroleum Refiner* **30**, 101-108 (1951) August.

From the theory of statistically indeterminate structures, mathematical expressions are developed for binding moments and stresses occurring around a cylindrical vessel supported on a series of equally spaced lugs. Solutions for typical cases are given.

C. von Fredersdorff

Wolosewick, F. E. SUPPORTS FOR VERTICAL PRESSURE VESSELS. PART III. *Petroleum Refiner* **30**, 143-145 (1951) October.

A qualitative discussion is given on reinforcement of vessels by ring stiffeners, circumferential supports of vertical vessels and methods of absorbing thermal expansions.

C. von Fredersdorff

Pulverization

Kearby, K. K. (assigned to Standard Oil Development Co.) PROCESS FOR SUBDIVIDING SOLID PARTICLES. U.S. 2,568,400 (1951) September 18.

The patent relates to a process for pulverizing solid particles which comprises charging the solids to a fluidized hopper whereby the larger particles settle to the bottom, at which point they are withdrawn and ground in a mechanical pulverizer. The particles are returned to the upper portion of the fluidized hopper. An intermediate side stream of particles is withdrawn from the hopper through a standpipe and injected through a pulverizing jet for further comminution. C. von Fredersdorff

Rotary Kilns

Saeman, W. C. PASSAGE OF SOLIDS THROUGH ROTARY KILNS. FACTORS AFFECTING TIME OF PASSAGE. *Chem. Eng. Progress* **47**, 508-514 (1951) October.

Mathematical relationships are derived for estimating the residence time and capacity of rotary kilns based on the simplified geometry of the system. C. von Fredersdorff

Steam Properties

Rubin, F. L. THE PRANDTL NUMBER FOR STEAM. *Chem. Eng. Progress* **47**, 541 (1951) October.

This dimensionless number is required for heat transfer by convection calculations. Experimental thermodynamic data was compiled for steam up to 1000° F and 2000 psia. The Prandtl number was calculated from this data and plotted in this article. S. Mori

Sulfur Supply

Higson, G. I. $CaSO_4$ AS A RAW MATERIAL FOR CHEMICAL MANUFACTURE. *Chem. Eng. News* **29**, 4469-4474 (1951) October 22.

The world-wide scarcity of elemental sulfur (for sulfuric acid manufacture) has forced the consideration of other sources of supply. Statistics on H_2SO_4 consumption, world reserves of sulfur, known deposits of iron pyrites now exploited for sulfur and for metals, known deposits of calcium sulfate, and plants and costs for manufacturing ammonium sulfate and sulfuric acid from calcium sulfate are presented, and discussed in considerable detail from a world economics viewpoint. These factors will have further repercussions upon present day ammonia and sulfur recovery practice in the gas and coke industry.

O. P. Brysch

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Automatic Analyzers

Uhl, W. C. ARE TOMORROW'S INSTRUMENTS HERE TODAY? *Petroleum Processing* **6**, 1123-1125 (1951) October.

Instrumentation relating to the use of electronics, servo-mechanisms, and automatic analyzers for the control of petroleum processing is discussed. Infrared analyzers have been developed for continuous analysis of gaseous or liquid samples for carbon monoxide, carbon dioxide, hydrocarbon and water content. An automatic titrometer has been developed for analyzing gasolines for mercaptan content.

C. E. Hummel

Flow Meter

Gentile, V., Jr. FLOW-MEASURING DEVICE. U.S. 2,573,430 (1951) October 30.

This invention relates to a flow-measuring device for fluids, the flow being measured from differential pressures of the flowing fluid.

E. J. Pyrcioch

Metering Liquids

Jacobson, S. W. POSITIVE DISPLACEMENT METERS FOR LIQUID HYDROCARBONS. *Pipe Line News* **23**, 39-43 (1951) October.

The requirements for satisfactory metering with positive displacement meters are briefly discussed. The accuracy of measurement to be obtained depends on the establishment of calibration facilities and on the operator following the required procedure. Drawings are given of eight different positive displacement meters.

O. T. Bloomer

Steam Purity

Powell, S. T. and McChesney, I. G. SIMPLIFIED PROCESS FOR DETERMINING STEAM PURITY. *Trans. Am. Soc. Mech. Engrs.* 73, 849-858 (1951) October.

The amount of contamination in the steam line can be obtained quantitatively by using a conductivity cell immersed in the condensed liquid phase kept at its boiling point. The readings may be recorded continuously under actual operating conditions. Previous attempts using this method met with difficulty due to the redissolved gases in the cell giving erroneous results. This has been remedied by increasing the steam velocity through the cell. Its performance under test and operating conditions indicates its usefulness.

S. Mori

Vacuum Controller

Youngs, C. G., Mallard, T. M., and Craig, B. M. PHOTOELECTRIC VACUUM CONTROLLER. *Can. J. Technology* 29, 447-450 (1951) October.

Pressure control of ± 0.1 mm in the range of 1 to 20 mm is obtained by the use of a light beam, photocell, and relay in conjunction with a standard Dubrovin gauge.

D. V. Kniebes

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Boyle, J. R. DEW POINT MEASURING APPARATUS AND METHOD. p. 284

Riordan, M. B. SURFACE INDICATING PRESSURE, TEMPERATURE AND FLOW EQUIPMENT. p. 279

12. MATERIALS OF CONSTRUCTION

Alloy Steels

Luce, W. A. STAINLESS STEELS AND OTHER FERROUS ALLOYS. *Ind. Eng. Chem.* 43, 2258-2271 (1951) October.

This is a review of literature of the past year about stainless steels and other ferrous alloys. Stainless steels are discussed under the following sections: titanium stabilization; *sigma* phase; corrosion; mechanical properties and structure; high temperature data; welding; and general, which includes subsections of manufacture, machining, powder, surface treatment and applications. Other ferrous alloys are discussed under sections titled: high-silicon iron; iron-nickel alloys; and austenitic manganese steels. Under each of the sections, the author includes an abstract of the literature cited and a short overall classification of significant developments pertaining to each of the sections. Some of the highlights indicated are the increased emphasis on conservation and substitution procedures, and the increased interest shown in the *sigma* phase and its effect on stainless steels. An extensive bibliography is included. E. J. Pyrcioch

Renshaw, W. G. and Ferree, J. A. PASSIVATING CHARACTERISTICS OF THE STAINLESS STEELS. *Corrosion* 7, 353-360, (1951) October.

Time-potential studies of the passivating characteristics of six stainless steels in air and several solutions are reported. Mechanically-treated surfaces were found to passivate as readily as other finishes. The end result of the various passivating treatments is the same type of metal surface. B. E. Hunt

Coatings

Munger, C. G. VINYL RESIN COATINGS. *Oil Gas J.* 50, 100-108 (1951) October 18.

A general description of the various vinyl resins is given. The advantages of using a complete paint system, primer, intermediate and seal coat, and thorough surface preparation are stressed. B. E. Hunt

NACE Coatings Committee. PROPOSED METHOD FOR MEASURING ELECTRICAL RESISTANCE OF COATINGS. *Gas Age* 108, 31-35, 70-72 (1951) September 27.

The equipment and procedure necessary for measuring electrical resistance of coatings on buried pipelines are described. The method is based upon the fact that the resistance of a conductor can be measured if the impressed potential and resulting current flow are known.

Typical calculation sheets and report forms are illustrated. Various test conditions are described in an appendix.

B. E. Hunt

Corrosion

Flint, D. and Kear, R. W. THE CORROSION OF A STEEL SURFACE BY CONDENSED FILMS OF SULPHURIC ACID. *J. Applied Chem.* (British) **1**, 388-393 (1951) September.

The rate of corrosion of a metal probe by condensed films of sulfuric acid was determined. It was found that the weight of iron corroded varies directly with the weight of acid deposited, and that there is a linear relationship between acid deposition, corrosion, and time. The increase in corrosion is much greater for an increase in dew point than for a corresponding decrease in surface temperature.

E. F. Searight

Glass, D. C. ECONOMICS OF RECTIFIER INSTALLATION FOR CATHODIC PROTECTION OF A BARE PIPE LINE. *Corrosion* **7**, 322-326 (1951) October.

An economic study, covering 10 years, of the material investment, operating costs, and power cost of a rectifier circuit for cathodic protection of a pipeline in Van, Texas, is presented. However, the main problem is to prevent further breaks in the pipeline due to corrosion, and a detailed description of the electrical installations, power requirements, and the distribution of the rectifier installations along the pipeline is discussed in the light of frequency of failure due to corrosion.

S. Mori

Hill, L. C. IT PAYS TO CONTROL. *Oil Gas J.* **50**, 287, 291 (1951) October 4.

The experiences of the author's company in protecting transmission lines, distribution systems, and meter runs from corrosion are related.

B. E. Hunt

Mason, J. F. 15 CORROSION CASE HISTORIES IN PETROLEUM REFINERIES. *Oil Gas J.* **50**, 114-126 (1951) October 18; *Petroleum Refiner* **30**, 124-131 (1951) October.

Fifteen case histories of corrosion in petroleum refineries are discussed. Each case is considered as to the materials used, the service conditions, and the results discussed.

B. E. Hunt

Parker, M. E. CORROSION AND ITS CONTROL. PART 30. CRITERIA FOR CATHODIC PROTECTION. *Oil Gas J.* **50**, 328 (1951) October 4.

Three possible criteria for pipe protection, negative charge on pipe surface, current flow from soil to structure, and pipe to soil protential, are discussed.

B. E. Hunt

Parker, M. E. CORROSION AND ITS CONTROL. PART 31. DESIGNING AGAINST CORROSION. *Oil Gas J.* **50**, 139 (1951) October 11.

Certain details are mentioned which are important considerations when designing against corrosion.

B. E. Hunt

Parker, M. E. CORROSION AND ITS CONTROL. PART 32. MINIMUM COST PROTECTION FOR SECONDARY LINES. *Oil Gas J.* **50**, 127 (1951) October 18.

The application of corrosion protection at a minimum cost is discussed.

B. E. Hunt

Parker, M. E. CORROSION AND ITS CONTROL. PART 33. CORROSION RECORDS. *Oil Gas J.* **50**, 137 (1951) October 25.

The value of quantitative information kept up to date for all pipe locations is stressed. The elimination of personal opinion with the emphasis on numerical data is preferred.

B. E. Hunt

Riesenfeld, F. C. and Blohm, C. L. CORROSION RESISTANCE OF ALLOYS IN AMINE GAS TREATING SYSTEMS. *Petroleum Refiner* **30**, 107-115 (1951) October.

This article completes a series of three by the same authors on the subject of corrosion in amine gas treating plants. The program was conducted step-wise, starting on a laboratory scale with small specimens of carbon steel and different alloys for possible use in treating plants. This initial work was reported in *Petroleum Refiner*, April, 1950, p. 141. The next step included corrosion experiments in small pilot units operated at field conditions, as re-

ported in *Petroleum Refiner*, February, 1951, p. 97. This presentation extends experience into the full scale application of aluminum and various ferrous alloys for the fabrication of such process equipment. In addition, there are presented some preliminary laboratory data on the corrosion of metals in an aqueous solution of methyl-diethanolamine. Finally, the status of the present knowledge on corrosion problems in amine gas treating systems is reviewed and summarized. Authors' Abstract

Sereda, P. J., Thomas, W. R. and Cohen, M. AN INVESTIGATION OF THE CORROSION OF DOMESTIC HOT WATER TANKS. *Can. J. Technology* 29, 435-446 (1951) October.

Considerable numbers of failures took place in the domestic hot water heaters in Ontario due to the reversal of the galvanic cell of the iron-zinc couple. Extent of corrosivity was measured by means of both physical and metallographical examinations. Factors such as water composition, temperature distribution in the tank, flow rate, flaws in coating the zinc layer, and the porosity of zinc were investigated, and discussed separately. S. Mori

Heat Insulator

Abrahams, S. A. BETTER MAGNESIA INSULATION BY NEW PROCESS. *Chem. Eng.* 58 140-142 (1951) September.

A magnesia insulation combining the advantages of accurate size and smooth finish as the result of low shrinkage (0.25%) during drying and controlled low density (10-11 lb per cu ft) and low conductivity (k = 0.491 to 0.504 at 500° F) as the result of precise blending is described. The insulation is 85% normal magnesium carbonate hydrate and 15% asbestos fibers. Needle-shaped magnesia crystals of the desired size are formed in a vacuum precipitator. Maximum practical strength of the asbestos fibers is obtained by limiting the degree of milling. This mixture, plus enough water to obtain the desired density, is fed into self-set molds, then dried. The finished product can be made into larger pipe sizes than is possible with pressure-molding, and the accuracy permits insulation to be built up to any desired thickness. A flow sheet and description of the process are included in the article.

J. J. Guyer

INSULATION AND APPLICATION METHODS FOR HEATED PIPING. *Petroleum Engr.* 23C, 44-46 (1951) October.

Certain procedures for the application of blanket-type and molded-type insulation to heated pipes are described. The various advantages and disadvantages of each type of insulation are discussed. B. E. Hunt

Pipe Materials

McLaughlin, C. B. PIPING MATERIALS FOR CHEMICAL PROCESSES. *Heating, Piping, & Air Conditioning*, 23, 85-94 (1951) October.

This is a broad, general discussion of the many factors to be considered in the selection and design of piping materials. The factors included are the pressure and temperature ratings for pipe of varying wall thickness and composition, corrosion and welding properties of metals, and methods of fabrication. The major low alloys are classified and their service temperature ranges given. Material and installation costs for carbon and alloy steel, and nickel alloy and aluminum piping are given. The various types of joints are described and compared and several "tricks of the piping trade" are given.

C. L. Tsaros

Refractories

Williams, A. E. REFRACTORY CONCRETE. *Ceramics*, 3, 378-383 (1951) September.

A detailed discussion is given on the preparation and properties of refractory concretes including calcium aluminates, chrome, magnesia and fused alumina mixtures.

C. von Fredersdorff

Witschey, R. A. REFRACTORY SPECIALTY PRODUCTS. *Oil Gas J.* 50, 147 (1951) October 18.

This article deals with the refractory and insulating materials which are furnished in the form of mortars, coating materials, castables, and plastic refractories. Each of these is defined generally, and a table of properties of some refractory and insulating castables is given.

J. J. Guyer

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Kear, R. W. THE INFLUENCE OF CARBON SMOKES ON THE CORROSION OF METAL SURFACES EXPOSED TO FLUE GASES CONTAINING SULFUR TRIOXIDE. p. 283

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Heating, Piping and Air Conditioning

Independent Petroleum Association of America Monthly
Industrial and Engineering Chemistry
Industrial Gas
Industrial Gas (British)
Industrial Heating
Institution of Gas Engineers: Bulletins, Communications and Transactions (British)
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LP Gas

Materials and Methods
Mechanical Engineering
Mining Engineering

National Fire Protection Association Quarterly
National Gas Bulletin (Australia)
National Petroleum News
Nature (British)
Nucleonics

Official Gazette of the U.S. Patent Office
Oil and Gas Journal

Petroleum (British)
Petroleum Engineer
Petroleum Processing
Petroleum Refiner
Physics Today
Pipe Line News
Power
Power Engineering
Proceedings of the Institute of Radio Engineers
Public Utilities Fortnightly

Refrigerating Engineering
Review of Scientific Instruments
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Science
Southern Power and Industry
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Transactions American Society of Mechanical Engineers
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World Oil